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NASA
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FEBRUARY 25, 1986

Space Science and Applications Notice

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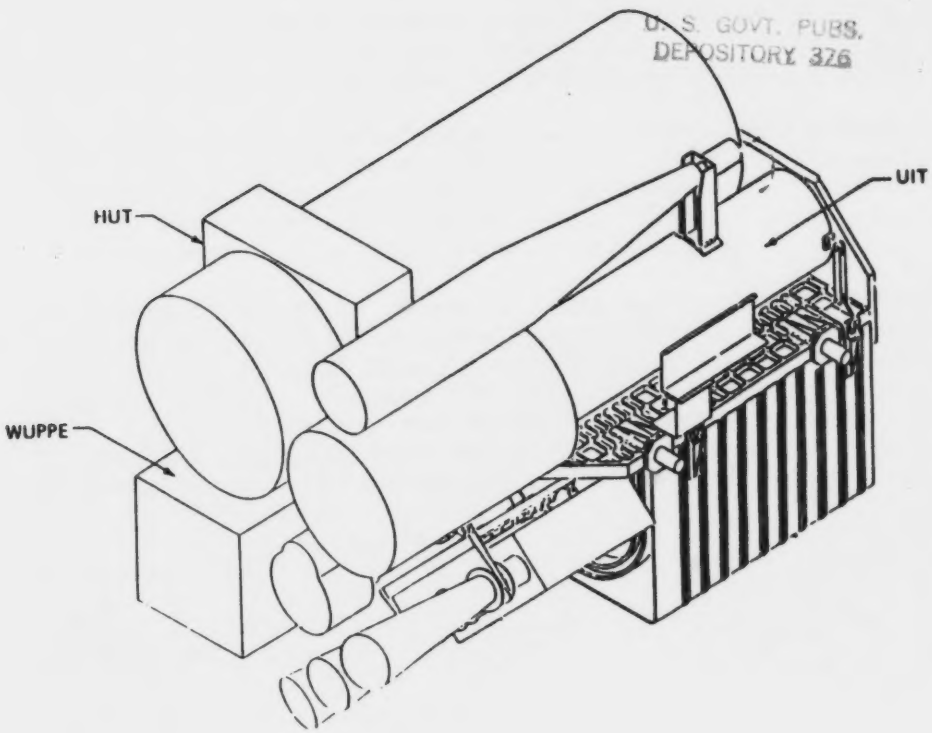

ASTRO GUEST INVESTIGATOR PROGRAM (POSTPONED)

NASA
National Aeronautics and
Space Administration

Washington, D.C.
20546

FEB 25 1986

Reply to Attn of: EZ (EJW)

Dear Colleague:

The National Aeronautics and Space Administration (NASA), Office of Space Science and Applications, issued a Notice in December 1985, which announced the continuing opportunity to participate in the Astro Guest Investigator Program. We had planned to conduct a peer review this spring of all proposals in hand by March 1, 1986. A subsequent update to this Notice was issued on January 24, 1986, which announced a small extension of the recommended proposal submission deadline to April 15, 1986. This update was necessitated as the launch of Astro-2 had slipped 2 months to January 1987. All of these actions occurred prior to the Space Shuttle accident on January 28, 1986. Due to this accident, and the subsequent temporary termination of Space Shuttle flight operations, NASA has decided to postpone the launch of the Astro-1 mission (originally scheduled for March 6, 1986).

The commencement of the Astro Guest Investigator Program will also have to be postponed until NASA has a better understanding of the new schedule for the Astro missions. We remain committed to the original plan of three Astro flights with significant guest investigator opportunities on the second and third flights.

To insure an adequate amount of time for proposal preparation, NASA will reissue an updated Space Science Notice on the Astro Guest Investigator Program about 4 months prior to the recommended final proposal submission date. At this point in time, I would anticipate that such a reissue of the Notice will not occur before July 1986. If you have any questions concerning the Astro Guest Investigator Program, please contact Dr. Edward J. Weiler, Astro Program Scientist, at (202) 453-1469.

Sincerely,

B. I. Edelson
Associate Administrator for
Space Science and Applications

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Space Science & Applications Notice

PLANETARY MATERIALS AND GEOCHEMISTRY

NAS 1.52/2

CHECKLIST

- Are you submitting your proposal prior to the end of July 1986, in order to make the early fall 1986 proposal review? Late proposals risk not being reviewed until the 1987 review cycle. Early submission will greatly facilitate the review process.

- Do the first four pages of your proposal consist of the correctly filled in forms provided at the end of this Notice?

- Have you signed the proposal and obtained the signature of an authorizing official in your institution?

- Have you enclosed the proper number of proposal copies (see Section VI):
  Full proposal - 18 copies plus 8 sets of reprints
  Reduced Scope Proposal - 8 copies plus 8 sets of reprints

- Have you enclosed a separate set of 35 copies of the first four pages of your proposal (15 copies for reduced scope proposals)?

- Are you mailing all copies to the Lunar and Planetary Institute?

- If you or your institution's business office wish to be notified of NASA's receipt of your proposal, fill out and address the enclosed postal cards (both sides) and return them with your proposal.

IF YOUR BUSINESS OFFICE HAS THE RESPONSIBILITY FOR ANY OF THE ABOVE ITEMS, PLEASE SEE THAT THEY ARE AWARE OF THESE INSTRUCTIONS

National Aeronautics and
Space Administration

Washington, D.C.
20546

Reply to Attn of EL

Dear Colleague:

This letter calls your attention to the continuing opportunities for participation in planetary science research sponsored by the Planetary Materials and Geochemistry Program (including the Early Crustal Genesis Project) of the Solar System Exploration Division, Office of Space Science and Applications.

This research and analysis program is a fundamental part of NASA's solar system exploration effort. It supports the analysis of data and materials collected by past missions, provides for the generation of new information necessary to interpret the data so returned, and promotes new syntheses of all available data to increase our understanding of the origin and evolution of the solar system, the nature of the Earth in comparison with other planets, and the origin and distribution of life in the universe. At the same time, these activities reveal new horizons for future exploration and exploitation of the planets, satellites, and small bodies of the solar system.

Past research sponsored by the Planetary Materials and Geochemistry Program has contributed significantly to all these endeavors, and I am confident that it will continue to do so. I emphasize that this is a dynamic program. While many efforts have a continuing character, the infusion of new ideas is always desirable and well-conceived proposals for new, innovative research are welcome. Our goal is to support a balanced program that addresses as many high priority areas of research as possible.

A few areas of current interest can be identified where innovative research would be especially valuable. There is continuing interest in studies that provide new insights into the nature and primordial differentiation of the Moon, its lateral and vertical compositional variations, and its history of internal melting. Other areas of interest are the origin of ancient plains on cratered planets (including the Moon); evolution of the satellites of the outer planets; and studies of meteorites and cosmic dust, especially as the studies relate to pre- and early solar system history.

While activities in the above and other unspecified research areas may be somewhat constrained by available funding, a significant amount of research will be supported, and this program will continue in the future to support the kinds of innovative research that have been its hallmark.

The guidelines which follow will be valuable to those of you who wish to propose. While the format outlined is not mandatory, its use will simplify preparation and will expedite review of your proposals and notification of the results. Other information in the guidelines is absolutely necessary to you, however, including submission times and place of submission. I encourage you to read the guidelines with care.

Sincerely,

B. I. Edelson
Associate Administrator for
Space Science and Applications

Enclosures

ENCLOSURE 1

GUIDELINES FOR PARTICIPATION IN

THE PLANETARY MATERIALS AND GEOCHEMISTRY PROGRAM

TABLE OF CONTENTS

ENCLOSURE 1

Guidelines for Participation in the Planetary Materials and Geochemistry Program

Page

I. PURPOSE....1

II. SCOPE OF PROGRAM....1

III. GENERAL GUIDELINES....4

A. NASA Policy on Unsolicited Proposals....4

B. Disclosure of Proposal Data....4

IV. SCHEDULE....5

A. Submission and Review....5

B. Approval and Awards....5

V. PROPOSAL FORMAT AND CONTENT....6

A. Format....6

B. Technical Information....6

C. Administrative and Budgetary Information....9

D. Sponsorship....11

VI. PROCEDURES FOR SUBMISSION....11

A. Domestic Proposals....11

B. Foreign Proposals....12

C. All Proposers....13

D. Further Information....13

TABLE OF CONTENTS (Continued)

VII. SOURCES FOR INFORMATION, USEFUL POINTS OF CONTACT, AND SAMPLE STUDY FACILITIES.....14

A. General Lunar and Planetary Information.....14

B. Data from Completed NASA Flight Programs.....15

C. Data from USSR Programs.....15

D. Lunar Sample Experiment Facilities.....15

E. Lunar Sample Data.....16

F. Sample Security Requirements.....16

VIII. EDUCATIONAL AND PUBLIC AFFAIRS MATERIALS.....16

MODEL FORMAT 1-5

I. PURPOSE

These guidelines provide procedural and format information for submission of unsolicited proposals for research in the areas of Planetary Materials and Geochemistry. These research areas are elements of a broadly based program of planetary research that is managed by NASA's Solar System Exploration Division.

II. SCOPE OF PROGRAM

The Planetary Materials and Geochemistry Program supports scientific investigations that may involve laboratory studies of a variety of extraterrestrial materials (lunar samples, meteorites, and cosmic dust) or are aimed at understanding the geochemical nature of the Moon, the planets, other satellites, and small bodies of the solar system. It also supports more general studies concerned with the formation and chemical development of the solar system. The goals of this program are to support research projects that increase the understanding of the origin of the solar system and the processes by which its planets and small bodies have evolved to their present state and/or yield direct information about the formation of the solar system, the exact time scales for planetary formation and history, the nature and development of planetary surfaces, and the past activity of the Sun and cosmic rays. Individual investigations may involve direct measurements of physical and chemical properties, or research efforts which contribute new data, which analyze and synthesize existing data, or which combine both kinds of activities. Examples of kinds of research supported by this program include: theoretical studies of solar system formation; studies of chemical differentiation of planetary bodies; laboratory studies of phase stability, thermal emission, chemical partitioning, and other processes necessary to interpret planetary data; synthesis of previously obtained geochemical data; and direct measurements of mineral composition, major and trace element chemistry, radiometric ages, magnetism, and radiation exposure effects.

NASA expects to support the best investigations in this program, subject to the constraints of available funds, the need to maintain programmatic balance, and the availability of sample materials. Innovative proposals for problem-oriented research in the areas described are encouraged, both from scientists who have previously participated in such programs and from scientists who have not. Because of the complex nature of many planetary problems, proposals from consortia of scientists having different disciplinary backgrounds are also encouraged where appropriate.

A compilation of abstracts from proposals currently being supported by the Planetary Materials and Geochemistry Program is available on request from the Discipline Scientist at the address given on page 2.

Lunar Sample Research. An important goal of the Solar System Exploration Division, in addition to research, is to facilitate access to data and lunar sample material for certain scientific and educational purposes not involving NASA-supported research projects. In particular,

lunar sample specimens can be made available on short-term loans for certain educational purposes. Details are in Section VIII.

Since FY 1978, research on lunar samples has been supported by both NASA and the National Science Foundation (NSF). Both NASA and NSF will consider proposals for lunar sample research in FY 1987. NASA is particularly interested in proposals for lunar sample research projects that closely support its activities of exploring the solar system, determining its nature, origin, and history, and developing techniques for further exploration. In general, NASA-supported lunar sample research will include the following topics: highland petrology, regolith studies, carbon and light elements, exposure ages and radiation effects, magnetic properties, physical and mechanical properties, optical properties, craters and microcraters, and surface and space environment effects. NSF will consider a wider range of proposals that contribute to the development of new knowledge in the areas of planetary science and related fields. The same proposal may be submitted to both NASA and NSF if desired; however, such proposals should clearly state that they are being submitted to both agencies.

All foreign proposals for lunar sample studies will be evaluated by NASA and not by NSF, regardless of specialty. They should be submitted to NASA according to the guidelines contained in this Notice.

PI's who wish more information about future support of lunar sample research by NASA or NSF, or about submitting proposals to either agency, should contact the individuals listed below:

Discipline Scientist, Planetary Materials and Geochemistry
Attn: Donald D. Bogard
Code SN4
Johnson Space Center
National Aeronautics and Space Administration
Houston, TX 77058
Phone (713) 483-2296 FTS 525-2296

Program Director, Geochemistry
Division of Earth Sciences
National Science Foundation
1800 G. Street, N.W.
Washington, D.C. 20550
Phone (202) 357-7916 FTS 357-7498

Lunar Sample Security. Responsibility for security of, and access to, the lunar sample collection remains with the NASA Johnson Space Center (JSC). NASA and NSF have established procedures to ensure that Principal Investigators (PI's) funded by NSF can obtain the necessary access to lunar samples. All PI's, both domestic and foreign, gain access to lunar samples through a "Lunar Sample Loan Agreement" between NASA and the PI's institution. Copies of this agreement are available from the Lunar Sample Curator:

Dr. D. P. Blanchard, Curator
Code SN2
Johnson Space Center
National Aeronautics and Space Administration
Houston, TX 77058
Phone (713) 483-3274 FTS 525-3274

Antarctic Meteorite Collection. As part of a joint program between NASA, the National Science Foundation, and the Smithsonian Institution (SI), the hundreds of well-preserved meteorites now being collected from the Antarctic ice cap are being maintained, characterized, and distributed by the Planetary Materials Laboratory at the NASA Johnson Space Center, Houston, TX 77058. These specimens constitute an important new resource for a wide range of studies: mineralogy, petrology, chemistry, organic content, exposure ages, and relations to the Antarctic environment and the history of the polar ice cap. For information on how to obtain specimens of these meteorites, contact the Curator, Planetary Materials Laboratory (address given in Section VII, G) or contact:

Program Manager
Polar Earth Sciences
Division of Polar Programs
Room 623
National Science Foundation
Washington, D.C. 20550
Phone (202) 357-7894 FTS 357-7894

Cosmic Dust Collection. The collection of interplanetary dust particles by high altitude aircraft makes available this type of extraterrestrial material for scientific research. Studies of particles already obtained have shown the potential importance of this material, which may be some of the most primordial solar system matter available, possibly from a cometary source. The NASA Johnson Space Center is responsible for the program to collect, preserve, handle, and distribute these dust particles so that they can be studied by a wider community of interested scientists. For details about this collection program and the availability of cosmic dust particles for research, contact the Discipline Scientist for Materials and Geochemistry (address given above and in Section VII, D) or the Curator, Planetary Materials Laboratory (address given in Section VII, F).

Early Crustal Genesis Project. Although proposals to this project have been submitted separately in prior years, they should be submitted this year according to the instructions in this notice. The project is aimed at understanding the formation and evolution of the crusts of the terrestrial planets. The specific objectives are to identify the key physical and chemical processes and the initial conditions for crustal evolution, to understand the evolution of planetary crusts in relationship to the overall history of individual planetary bodies, and to understand the reasons for differences in evolution among the various planetary crusts. A significant body of data exists from lunar and meteorite studies regarding models of crustal formation and evolution.

Less data exist for most other planetary bodies. Terrestrial studies, however, can provide the detailed data that will help to test and develop such models as well as their application to other planetary bodies. Proposals for participation in this project should clearly develop the nature of this planetary connection!

III. GENERAL GUIDELINES

A. NASA Policy on Unsolicited Proposals

Proposers should be aware of the general policy at NASA with respect to unsolicited proposals. Specifically, the NASA Procurement Regulation, Part 4, specifies that the initial receiving office, prior to making a comprehensive evaluation of a document apparently submitted as an unsolicited proposal, shall determine that the document: (1) contains sufficient scientific, technical, and cost information to enable meaningful evaluation; (2) has been approved by a responsible official of the proposing organization or a person authorized to contractually obligate such an organization; and (3) does not merely offer to perform standard services or to provide "off-the-shelf" articles. If the document does not meet these requirements, a comprehensive evaluation will not be made and the document will be handled as correspondence.

B. Disclosure of Proposal Data

It is NASA's policy to use the technical data contained in proposals for evaluation purposes only. Where any of such technical data constitutes a trade secret under the law and the offeror, or his potential subcontractor, desires to maintain trade secret rights in such technical data, the following "Notice" must be affixed to the cover sheet of the proposal specifying therein the pages of the proposal which contain trade secrets to be restricted in accordance with the conditions of the "Notice." Thereafter, it is NASA policy to protect such noticed technical data as a trade secret. NASA assumes no liability for use or disclosure of any proposal technical data to which the "Notice" has not been applied.

The text of the "Notice" is as follows:

NOTICE

> Data on pages _____ of this proposal constitute a trade secret. It is furnished to the government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes, provided however, in the event a contract is awarded on this proposal the government may obtain in the contract additional rights to use and disclose this data.

IV. SCHEDULE

A. Submission and Review

The Planetary Materials and Geochemistry Program is an open and continuing program in which unsolicited proposals may be submitted at any time. In order to make the best use of resources, however, the review of proposals is undertaken only once each year, usually September-October.

Proposals received by NASA before the end of July 1986 will be reviewed in September-October 1986 by a panel composed of the proposer's peers. In their deliberations, the reviewers will consider the need for the proposed work, the soundness of proposed approaches, the proposer's understanding of the research area, the originality of the proposed work, the competence and skills of the proposer and team, the quality of past work, and the adequacy of the proposer's facility. The panel will provide NASA with summary reviews of each proposal and recommendations as to whether or not the proposal should be accepted.

Selection of proposals for participation in the Planetary Materials and Geochemistry Program will be made by NASA based on the reviews, program needs, and availability of funds. Proposers will be notified of the results of the review and selection process by mid-December 1986.

Generally, it will not be possible to evaluate proposals received significantly after the end of July 1986, until the next review cycle. Proposers will be notified, and the proposal will be held for review in October 1987, if appropriate.

B. Approval and Awards

Proposals which are approved during the fall 1986 review will normally have starting dates in the months of February through May of the following year. Awards generally will be processed from the NASA Johnson Space Center, Houston, Texas. Arrangements for foreign participation in these programs will be made through the International Affairs Division, NASA Headquarters (address given in Section VI, B).

Proposals may be submitted which request periods of performance of one or more years. However, proposals which are approved and can be funded within the available budget will normally result in awards that are for a period not in excess of 12 months. Renewal proposals are required for all subsequent year funding.

The program office will select a significant number of high-quality, long-term research efforts for "continuing award" agreements which provide for reduced requirements for second and third year renewal proposals. In these cases, but only if he or she has been so informed by the Discipline Scientist, an investigator may elect to rely on the scientific/technical evaluation of his original proposal and may submit an abbreviated renewal proposal for the second or third year of a two- or three-year effort.

This abbreviated proposal should consist only of a progress report, a brief work statement, updated cost information, and copies of papers resulting from the previous year's effort. The original proposal and its evaluation will be considered together with the progress report and updated cost information to determine if an extension is warranted. Awards for renewal funding for the extension are generally subject to the availability of funds, the proposal's continued relevance to NASA's programs, and a demonstration of satisfactory progress on prior effort.

V. PROPOSAL FORMAT AND CONTENT

A. Format

Models for a proposal cover sheet, abstract sheet, personnel sheet, and budget summary are enclosed. The use of these sheets in proposal preparation is encouraged. (Budget summary sheets are not needed for non-U.S. proposals.) These sheets (which may be duplicated for additional copies) should constitute the first four pages of all proposals. For more efficient logging and handling of proposals, it is requested that no additional covers, binders, etc., be used in front of the model cover sheet.

B. Technical Information

1. TITLE - The title should be informative, detailed, and as brief as possible. Proposers seeking extension of a current award should attempt to maintain the current title. The current grant/contract number should also be included.

2. ABSTRACT - The abstract should be prepared in a final, camera-ready form. We intend to publish a collection of the abstracts of all the funded proposals. This volume will be distributed to the scientific community without further editing. The "Proposal Summary" (the third of the four model sheets) should be used for this purpose.

In addition, this sheet will be used to help us prepare the technical summary required by our Procurement Office. Delays in funding will be minimized if the format described below is followed strictly.

The abstract should be typed, single-spaced, within the box drawn on the model sheet. Paragraphs numbered (a) through (d) should include the following:

a. a brief statement of the overall objective and justification of the work,

b. a summary of accomplishments during the period since the past proposal (for proposals requesting extension of current awards),

c. a brief listing of work to be accomplished during the award period and of the approach to be used, and

d. a bibliography of one or two recent publications by the proposer that are relevant to the study described in the proposal.

3. WORK STATEMENT - This section describes and justifies the proposed research. It should be as clear and concise as possible. The scientific objectives and significance of the investigation should be described briefly. Its relevance to lunar or planetary problems must be made clear. This material should be followed by a succinct but clear discussion of the experimental approach or methodology to be followed. When possible, each proposal should be divided into separate projects that can be conducted independently. These tasks should be enumerated and described. If the investigation cannot be completed within a 12-month period of the award, the work statement should contain a brief description of work plans and budget requirements for each year of the effort. It is suggested that the length of the work statement should not exceed ten (10) pages.

Investigators who have received a "continuing award" notice (See Section IV, B) on a proposed multiyear research project need only submit a progress report of the first or second year's effort, a budget, a brief work statement for the second or third year's effort, together with copies of papers or preprints resulting from the prior year's effort. The statement of work, and progress and budget statement together, should be less than five pages in length. All other information should be in an appendix. This information will be considered, along with the original evaluation of the scientific/technical

proposal, to determine if an extension is warranted. A complete new proposal must be submitted at the expiration of each two-year (or three-year, when applicable) period during the course of the project. In addition, a complete new proposal should be submitted at any time that the PI contemplates major changes in the planned scientific activities or in the estimated budget levels.

4. DATA AND LUNAR SAMPLE REQUIREMENTS

   a. Photographs and other data stored in NASA repositories are generally available for use by accepted investigators. The proposal should give sufficient detail on the requirements, quantity, and format of data desired (e.g., magnetic tape format compatible with the investigator's computer, microfilm of data plots, photos, etc.) for NASA to determine whether the data can be supplied.

   b. Proposers who wish to perform experiments on lunar materials should describe the specific types and amounts of lunar materials required. They should also specify the experimental procedures to be used and their effects on the lunar materials used. Because of the limited amount of materials available, nondestructive experimental techniques should be proposed wherever possible.

   c. All proposals which request that NASA supply lunar samples should demonstrate that the proposer is familiar with the actual materials available in the lunar sample collection. A source of information on the nature and availability of lunar samples is given in Section VII.

5. SUPPORTING FACILITIES - Laboratories, specialized equipment, etc., available for use in the research should be described. Equipment which is proposed to be purchased with NASA funds should be specified and justification should be given for the purchase.

6. SCIENTIFIC AND TECHNICAL PERSONNEL - For each participant in the proposed work, the level of effort should be listed in approximate percentage of time. A brief summary of the scientific background and relevant experience of the Principal Investigator (PI), and of each Co-Investigator (Co-I) must be given.

a. PI - The proposal must designate a PI who is responsible for the primary direction of the investigation. In projects including lunar sample research, the PI is also responsible for the security of the lunar samples. NASA will accept only one PI for a given research effort and will not accept "Acting PI's" or "Co-PI's."

b. Co-I - This title should be restricted to a limited number of well-qualified scientists who will be contributing materially to the research and who would be capable of independently directing the proposed research. Certain personnel (e.g., graduate students, postdoctoral fellows) should not be designated as Co-Investigators unless they meet these qualifications. It is generally more appropriate to designate such individuals as scientific collaborators.

c. Scientific Collaborators - All qualified scientists whose work on the research will be sponsored by NASA funds should be listed. For proposals in the sample program, all persons who will have access to the samples must be listed.

7. BIBLIOGRAPHY - This section should list all publications by the PI and the Co-I's that are specifically relevant to the proposed research, or to planetary studies in general.

8. PROGRESS REPORT - This section applies to those PI's who are currently supported by NASA for research on lunar and planetary problems. This report should cover the period since the submission of the last accepted proposal for this effort (generally 12 months). The report should include an analysis of achievements that have contributed toward the objectives outlined in the previous proposal, together with a complete list of all publications which have resulted from the research.

C. Administrative and Budgetary Information

1. BUDGET SUMMARY - A budget summary (not necessary for non-U.S. proposals) should be given in the format supplied and should be included as Page 4 of each proposal.

a. Summary or Detailed Budget(s) - Items 1 through 8 in the summary are straightforward and can be abstracted from the detailed budget. Item 9 is the total budget required to conduct the research for one year, regardless of any institutional contribution and any residual (carryover) funds remaining from previous awards. Item 10 is the institutional contribution (if any), and Item 11 is the estimated carryover of money from previous awards that will remain uncommitted at the end of the current award period. Item 12 is simply Item 9 less the sum of Items 10 and 11. It is the estimated amount of new funds required from NASA to carry out the proposed research. Item 13 is the total estimated amount of money and time required to carry the research to completion, if a multiyear effort is proposed. (NASA support of the complete effort will be contingent on the submission and acceptance by NASA of follow-on proposals.)

b. Summary by Task - Each proposal should be divided, when possible, into projects that can be conducted independently. These tasks should be enumerated and described in the Work Statement (Section V, B, 2). Estimated funds and manpower for these projects should be indicated in the Budget Summary.

2. DETAILED BUDGET - The detailed budget should itemize expenses in each of the categories listed on the Budget Summary sheet in sufficient detail to allow meaningful evaluation of costs. If sufficient detail is not provided, evaluation of the proposal will be postponed until such information is available; this may result in consideration being delayed until the next review cycle. The budget should give the total funds requested from NASA during the award period (generally 12 months). In the event that multiyear research is proposed, a detailed budget for the entire effort may be given. Any carryover funds expected to exist at the requested starting date of the proposal should also be specified.

3. INVESTIGATORS AT OTHER INSTITUTIONS - When scientific Co-Investigators or collaborators are not employed by the sponsoring institution, but are to be funded through this award, evidence of their commitment should be provided.

4. SOURCES OF OUTSIDE SUPPORT - The proposal should list other supported research conducted by the PI, name of sponsor, title of the research, and the level of funding received. There should be a similar listing for each Co-I who is to contribute to the research. The lists should include proposals for support that are currently under consideration.

5. DATES - The proposal should include the date of its preparation or submission and the proposed starting and completion dates of the research. The duration of the award will normally not exceed 12 months.

6. FOREIGN PROPOSALS - Foreign proposers should arrange their own funding support (see Section VI, B). Budget information is, therefore, not required in foreign proposals. Investigators are requested to comply with all other guidelines given above.

D. Sponsorship

1. DOMESTIC PROPOSALS - Investigators are normally sponsored by an educational or research institution or a corporation which must endorse the proposal and forward it to NASA.

2. FOREIGN PROPOSALS - Investigators from outside the United States should obtain prior endorsement from the official sponsoring agency of their government; such endorsement (see Section VI, B) is required for evaluation of the proposals.

VI. PROCEDURES FOR SUBMISSION

A. Domestic Proposals - Each proposal from an investigator within the United States should be submitted with a covering letter signed by an official of the proposer's sponsoring organization who is authorized to commit the organization to the proposal and its contents. The covering letter for a proposal to extend existing support should give the number of the current grant or contract or, in the case of a NASA Field Center, the RTOP/Task number, and should state that this proposal is for an extension.

1. FULL PROPOSALS - Full, complete, and detailed proposals, suitable for a complete peer review, should be submitted by the following categories of investigators:

a. Those making the first submission for a new research project.

b. Those submitting a proposal for continuation of a project that was approved for one year only.

c. Those who have been on a multiyear "continuing award" agreement (see Section IV, B) for which a full proposal is due in the current year. The proposal may request either a single year's support or a continuation of the existing multiyear status.

All of the following number of copies of FULL PROPOSALS are required:

1) Seventeen (17) copies (including progress reports). Seven (7) of these copies should include sets of pertinent reprints where applicable.
2) An original, signature version, including a set of reprints.
3) Thirty-five (35) copies of the first four pages, which are cover, personnel, abstract, and budget summary sheets.

2. PROPOSALS OF REDUCED SCOPE - Proposal of reduced scope ("short-form" proposals) should be submitted by investigators on multiyear "continuing agreement" status if they have been informed that a proposal of reduced scope is acceptable (see Section IV, B).

All of the following number of copies of REDUCED SCOPE PROPOSALS are required:

1) Seven (7) copies, including 7 sets of pertinent reprints.
2) An original, signature version, including a set of reprints.
3) Fifteen (15) copies of the first four pages, which are cover, personnel, abstract, and budget summary sheets.

3. PROPOSAL SUBMISSION - All proposals are to be sent to an address which is different from that given in the instructions for other NASA programs that consider unsolicited proposals.

All proposals to the Planetary Materials and Geochemistry Program should be mailed to:

The Lunar and Planetary Institute
Attn: Lunar and Planetary Proposal Review
3303 NASA Road 1
Houston, TX 77058

B. Foreign Proposals

Foreign proposals should be prepared as described above (see Section VI, A), except that no budget information need be included.

The same number of copies of foreign proposals is required as is required for full domestic proposals described above (i.e., 18 copies, 8 sets of pertinent reprints, and 35 sets of the first four pages). Foreign proposals should also be sent to the Lunar and Planetary Institute at the address given above.

In addition, one (1) copy of the proposal should be sent to:

International Affairs Division
Code LID (Planetary Materials and Geochemistry)
NASA Headquarters
Washington, DC 20546

Proposals should be in English and must be accompanied by a written endorsement by the official national agency of the proposer's country which is responsible for space and/or scientific activities. Should a proposal be selected, NASA will arrange with the sponsoring national agency for the proposed participation on a cooperative (no exchange of funds) basis, in which NASA and the foreign sponsoring agency will each bear the cost of discharging their respective responsibilities.

C. All Proposers

A sheet with postcards imprinted on it has been attached to the guidelines. These cards will be used to acknowledge the receipt of your proposal by NASA. Please type the name and address of the person(s) you wish to have notified on the front of the card. One card should be addressed to the appropriate business representative at your institution.

The final portion of the sheet, "information copy," is for our records. IT IS EXTREMELY IMPORTANT THAT YOU COMPLETE BOTH SIDES OF THIS SHEET AND RETURN IT WITH YOUR PROPOSAL in order to expedite notification of the receipt of your proposal and our management of it.

D. Further Information - Questions concerning submission to the Planetary Materials and Geochemistry Program should be addressed to:

Dr. Donald D. Bogard
Discipline Scientist
Planetary Materials and Geochemistry Program
Code SN4
Johnson Space Center
National Aeronautics and Space Administration
Houston, TX 77058
Phone (713) 483-2296, FTS 525-2296

VII. SOURCES FOR INFORMATION, USEFUL POINTS OF CONTACT, AND SAMPLE STUDY FACILITIES

Investigators should be aware of sources for data which might be used in their research. Before submitting a proposal, each investigator should determine that the required data can be made available. Useful contacts for making these determinations are given below:

A. General Lunar and Planetary Information

The Lunar and Planetary Institute (LPI) in Houston, Texas, is the most concentrated and readily accessible source of information on lunar science. Among the many valuable services available to the science community from the LPI are:

1. LPI BULLETIN - A periodic information bulletin published for free distribution to interested scientists and other individuals upon request.

2. LUNAR AND PLANETARY DATA CENTER - The LPI maintains an extensive library of reprints, books, journals, maps, photographs, data, etc., which are available for on-site use and, in special cases, for loan. The Data Center also serves as a source of general information on the kinds of lunar samples and returned artifacts in the collection at the NASA Johnson Space Center Curatorial Facility (Section VII, F).

3. LIBRARIAN SERVICES - Literature aids, bibliographies, and conference proceedings can be provided.

4. STAFF SCIENTISTS - Scientists who are active in lunar and planetary research and are involved in the maintenance of the Lunar and Planetary Data Center are available to assist in examination of data prior to proposal preparation.

5. LPI FACILITY - Arrangements can be made for an appointed investigator to conduct part of an approved investigation at the LPI. For more information about these appointments, write to:

   Director
   The Lunar and Planetary Institute
   3303 NASA Road 1
   Houston, TX 77058
   Telephone (713) 486-2180

B. Data from Completed NASA Flight Programs

Data from completed fight experiments are stored in the National Space Science Data Center (NSSDC). Data of interest to investigators include: (1) extensive lunar and planetary photographs, and (2) data from numerous flight science experiments. Information on the variety, format, and content of material available can be obtained from the NSSDC.

The address of the NSSDC is:

National Space Science Data Center
Code 601
Goddard Space Flight Center
National Aeronautics and
Space Administration
Greenbelt, MD 20771
Telephone (301) 344-6695

C. Data from USSR Programs

A limited amount of data from the USSR Zond and Luna flights are available in the United States. In addition, there have been some publications by U.S. scientists of their analyses of USSR lunar samples from Luna-16, -20 and -24. In order to obtain information on the availability of this data, please contact:

World Data Center-A
Code 601
Goddard Space Flight Center
National Aeronautics and
Space Administration
Greenbelt, MD 20771
Telephone (301) 344-6695

D. Lunar Sample Experiment Facilities

The Planetary Materials Laboratory at the NASA Johnson Space Center contains a laboratory for PI experiments. The purpose of this laboratory is to allow studies to be made on lunar samples that are too large to be taken to an investigator's own laboratory. Such studies as reflectance and magnetic measurements on whole rocks or on lunar core samples are possible. Volatiles may be extracted from the unprocessed lunar cores. Particle counting experiments would be possible also, as well as any other experiment that would not endanger or alter the samples. For information on this experiment facility, contact the Lunar Sample Curator at the address given below.

E. Lunar Sample Data and Lunar Sample Security Requirements

General information on the kinds of lunar samples and returned artifacts in the collection, their availability, and previous research carried out on them, can be obtained from the library at the LPI (see Section VII, A, 2). Detailed information on specific samples and information on sample security requirements can be obtained from:

Dr. D. P. Blanchard, Curator
Code SN2
Johnson Space Center
National Aeronautics and
Space Administration
Houston, TX 77058
Telephone (713) 483-3274, FTS 525-3274

VIII. EDUCATIONAL AND PUBLIC AFFAIRS MATERIALS

It is possible to obtain a great variety of educational materials and information about past lunar and planetary research without submitting a formal proposal for a major research effort. Data and photography from spacecraft missions, described in Section VII, B, are available upon written request to the NSSDC. For requests involving modest amounts of data, charges may be waived when the data are intended for specific or scientific educational purposes. Some educational and general interest publications on the lunar and planetary programs are also available. Requests should be sent to:

Educational Services Branch
Code LFC
NASA Headquarters
Washington, DC 20546
Telephone (202) 453-8391

or:

Public Affairs Officer
Office of Space Science and Applications
Code E
NASA Headquarters
Washington, DC 20546
Telephone (202) 453-1754

A variety of lunar sample materials are also available for educational purposes, and simplified procedures have been developed to provide access to them:

A. A collection of petrographic thin sections of lunar samples is maintained by the Planetary Materials Laboratory at the NASA Johnson Space Center. Scientists and educators may obtain permission to examine these specimens within the Facility.

B. A set of petrographic thin sections of typical lunar samples is available for short-term loans to educators at colleges and universities in the United States. These sets, and their accompanying material, are designed for use in undergraduate courses in mineralogy and petrography.

C. A Lunar Sample Educational Package (LSEP) has recently been developed for use in secondary school science classes. The kit contains six small lunar samples which can be examined under a low-power microscope. Accompanying materials include teaching aids and a cassettee/slide show describing lunar science results obtained from the samples.

Further details about these programs can be obtained from the Lunar Sample Curator at the address given in Section VII, E.

Some access to lunar data is possible for teachers and other educators through the facilities of the Lunar and Planetary Institute which are described in Section VII, A.

ENCLOSURE 2

MODEL FORMATS

(COVER SHEET)

LOG NO. _____

Date Received _____

DO NOT WRITE IN THIS SPACE

SOLAR SYSTEM EXPLORATION DIVISION
PLANETARY MATERIALS AND GEOCHEMISTRY PROGRAM

☐ Full Proposal ☐ Progress Report

TITLE: _____

DATE SUBMITTED: _____

PRINCIPAL INVESTIGATOR: _____
(Signature and Date)

_____
(Typed Name)

_____
(Address, including Zip Code)

_____

_____
(Telephone Number, including Area Code)

AUTHORIZING INSTITUTIONAL OFFICIAL: _____
(Signature and Date)

_____
(Typed Name)

_____
(Address, including Zip Code)

_____

_____
(Telephone Number, including Area Code)

CO-INVESTIGATORS AND THEIR AFFILIATIONS:

SCIENTIFIC COLLABORATORS AND THEIR INSTITUTIONAL AFFILIATIONS:

BUSINESS REPRESENTATIVE OR SPONSORING AGENCY OFFICIAL:
(Name, Title, Complete Address, and Telephone Number)

ADDITIONAL INFORMATION IF NEEDED:

PROPOSAL SUMMARY

PRINCIPAL INVESTIGATOR: _____
(Names, Address, _____
Telephone Number) _____

CO-INVESTIGATORS: _____
(Name Only) _____

TITLE: _____

ABSTRACT: (Type single-spaced within box below. Paragraphs numbered (a) through (d) should include: a. brief statement of the overall objectives and justification of the work; b. brief statement of the accomplishments of the prior year, or "new proposal;" c. brief listing of what will be done this year, as well as how and why; and d. one or two of your recent publications relevant to the proposed work.)

BUDGET SUMMARY

PRINCIPAL INVESTIGATOR: _____

PROPOSAL TITLE: _____

DESIRED STARTING AND ENDING DATES: _____

GRANT, CONTRACT, OR RTOP NUMBER: _____

SUMMARY OR DETAILED BUDGET(S)

1. Salaries and Wages _____
2. Supplies and Materials _____
3. Equipment Purchases _____
4. Computer Time _____
5. Laboratory Rental and Services _____
6. Publication and Communications _____
7. Travel _____
8. Other (including overhead and benefits) _____
9. Total Budget/ 12 Months _____
10. Budget/11 Months Institutional Contribution _____
11. Budget/12 Months Carryover _____
12. Budget/12 Months New Funding Requested from NASA _____

13. Estimated Totals to Completion of Research:

Funds: _____ Months: _____

SUMMARY BY TASK: (Approximate breakdown; nearest $K, nearest 0.1 manyear)

Task No.	Abbreviated Title	Funds	Manyears Sen.Res.	Post-Doc.	Stu.	Tech.	Other
1.							
2.							
3.							
4.							
5.							
6.							

MODEL TABLE OF CONTENTS

(Please give page numbers)

COVER SHEETS

- TITLE PAGE
- OTHER PERSONNEL
- PROPOSAL SUMMARY WITH ABSTRACT
- BUDGET SUMMARY

TABLE OF CONTENTS

WORK STATEMENTS

DATA REQUIREMENTS

SUPPORTING FACILITIES

SCIENTIFIC AND TECHNICAL PERSONNEL

BIBLIOGRAPHY

ADMINISTRATIVE AND BUDGETARY INFORMATION

* U.S. GOVERNMENT PRINTING OFFICE: 1986-491-574:40003

National Aeronautics and
Space Administration

Washington, D.C.
20546

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WASHINGTON, D.C.
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NASA
National
Aeronautics and
Space
Administration

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Space Science & Applications Notice

PLANETARY GEOLOGY AND GEOPHYSICS PROGRAM

NAS1.53/2:

National Aeronautics and
Space Administration

Washington, D.C.
20546

Reply to Attn of: EL

Dear Colleague:

This letter calls your attention to the continuing opportunity for participation in the Planetary Geology and Geophysics Program.

The Planetary Geology and Geophysics Program supports scientific investigations which contribute to understanding the geological and geophysical evolution of the planets, their satellites (including ring systems and Earth's Moon), and such smaller solar system bodies as asteroids and comets. These investigations involve several types of research efforts: generation of new, basic data; analysis and synthesis of existing data; or combination of both kinds of activities. The goals of this program are to foster the gathering, synthesis, and comparative study of data that will improve the understanding of planetary geological and geophysical processes, their extent, and the results of their interactions through time; the origin and evolution of the solar system; the nature of Earth in comparison with other planets; and the origin and distribution of life in the universe. Examples of the kinds of research supported by this program include: laboratory, theoretical, and earth analog studies of the surfaces and interiors of planetary bodies and the dynamical evolution of the planets, satellites, small solar system bodies, and ring systems. The program includes, without limitation, laboratory experimentation; photointerpretation; theoretical, analytical, field, and comparative studies; and cartographic compilation. Planetary cartography and geologic mapping are also supported by this program.

The Planetary Geology and Geophysics Program is an open program in which unsolicited proposals may be submitted at any time. However, it is contemplated that proposals will be reviewed by a scientific peer group on a periodic basis. Proposals received by NASA before the end of July 1986 will be reviewed in September 1986 by a peer panel. Proposals received by NASA after the end of July 1986, but before January 1987, will be reviewed in March by a peer panel. Thus, to receive funding starting in early FY 1987, your proposal must be received by the end of July 1986, and to receive funding starting in late-FY 1987, your proposal must be received by January 1987. Selection of proposals for participation in the Planetary Geology and Geophysics Program will be made by NASA based on the reviews, program needs, and availability of funds.

Instructions for submittal of U.S. proposals are contained in the enclosure. To be considered, non-U.S. proposals require endorsement and financial support from a foreign agency. Additional instructions for submittal of foreign proposals are contained in the enclosure. Proposals may be submitted covering any period of performance. However, proposals which are accepted will normally result in awards for a period not in excess of 12 months. Renewal

proposals are required for all subsequent year funding. In order to insure continuity of funding, renewal proposals should be submitted as per instructions in enclosure 1 at least four months prior to the anniversary date of the grant or contract.

Investigators may submit a progress proposal for the second or third year of a two- or three-year effort if they have been informed of acceptance for a continuing award status. This abbreviated proposal should consist of a progress report, a work statement, updated cost information, and copies of reports resulting from the previous year's effort. The original proposal and its evaluation will be considered with the progress report and updated cost information to determine if an extension is warranted. Extension of a grant or contract beyond the period of performance contemplated by an initial award is generally subject to the availability of funds, the proposal's relevance to NASA's programs, and a demonstration of satisfactory progress on prior effort.

The enclosed guidelines (Enclosure 1) should clarify the procedures for submission of proposals. Although utilization of these guidelines is not required in preparing a proposal, their use should simplify both preparation and review of your proposals and will thus facilitate prompt notification of the results.

If you have questions regarding data availability, proposal format, evaluation procedures, etc., you should contact Dr. David H. Scott, Discipline Scientist, Planetary Geology and Geophysics Program, Solar System Exploration Division, Code EL, NASA Headquarters, Washington, DC 20546, telephone (202) 357-1459.

Sincerely,

B. I. Edelson

B. I. Edelson
Associate Administrator for
Space Science and Applications

Enclosures

CHECKLIST

- Do the first four pages of your proposal consist of the correctly filled-in forms provided in this Notice (last four pages)?

- Have you signed the proposal and obtained the signature of an authorizing official in your institution?

- Have you enclosed a Progress Report (for continuing proposals)?

- Have you enclosed six sets of pertinent reprints of recent papers in review; copies of the proposal for Lunar Planetary Institute and one set for NASA Headquarters?

- Have you assembled the proper number of copies?

  - One original and one copy of full proposal to NASA Headquarters and 15 copies of full proposal and a separate set of 40 copies of the first four pages of your proposal to Lunar and Planetary Institute (see pages 1, 2, and 5).

  - One original and one copy of progress proposal to NASA Headquarters (see pages 1, 2, and 5), 10 copies to Lunar and Planetary Institute with a separate set of 40 copies of the first four pages.

IF YOUR BUSINESS OFFICE HAS THE RESPONSIBILITY FOR ANY OF THE ABOVE ITEMS, PLEASE SEE THAT THEY ARE AWARE OF THESE INSTRUCTIONS.

ENCLOSURE 1

GUIDELINES FOR PARTICIPATION IN

PLANETARY GEOLOGY AND GEOPHYSICS PROGRAM

TABLE OF CONTENTS

ENCLOSURE 1

GUIDELINES FOR PARTICIPATION IN PLANETARY
GEOLOGY AND GEOPHYSICS PROGRAM

Page

I. PURPOSE....1

II. PROPOSAL CONTENT AND FORMAT....1

A. Number and Length....1

B. Cover Letter....3

C. Title Page....3

D. Abstract Page....3

E. Description of Proposed Research....4

F. Cost Plan....4

G. Attachments....4

H. Data Requirements....4

I. Other Federal Support....5

J. Disclosure of Proposal Data....5

III. GENERAL POLICY....5

IV. PROPOSALS FROM NON-U.S. ORGANIZATIONS....6

TABLE OF CONTENTS (Continued)

V. SOURCES OF INFORMATION AND DATA.....6

A. Data from Completed NASA Flight Programs and Lunar Cartographic Products.....6

B. Planetary Cartographic Products.....7

C. Planetary Geology Space Image Centers.....7

D. General Lunar and Planetary Information.....7

E. Digital Planetary Image Data.....7

MODEL FORMAT

I. PURPOSE

These guidelines contain format and mailing information for submission of unsolicited proposals for research related to the Planetary Geology and Geophysics Program. Although utilization of the proposal format is not required, it is believed that its use should simplify preparation and review of your proposal.

II. PROPOSAL CONTENT AND FORMAT

The content of the proposal should be in sufficient detail to enable a reviewer to make a judgement with respect to: (1) the relevance of the proposed research to the Planetary Geology and Geophysics Program, (2) the probability that the investigators will be able to accomplish the stated objectives within the requested resources, and (3) its overall merit.

A. Number and Length

Each proposal from an investigator within the United States should be submitted under covering letter signed by an official of the proposer's sponsoring organization who is authorized to commit the organization to the proposal and its contents. The covering letter for a proposal to extend existing support (renewal proposal) should give the number of the grant, contract, or, in the case of a NASA Field Center, the RTOP/Task number, and should state that this proposal is for extension.

1. Full Proposals - Proposals for New Work (first submission) and submissions by investigators whose original proposals were approved previously as multi-year proposals (three (3) year maximum period) but have terminated.

The address to which proposals are to be sent is an exception to the normal unsolicited proposal submission instructions. Fifteen (15) full copies and forty (40) copies of the first four pages of your proposal, including six (6) sets of pertinent reprints where applicable, should be sent to:

The Lunar and Planetary Institute
Attention: Lunar and Planetary Geoscience
3303 NASA Road 1
Houston, TX 77058

Two (2) copies, including an original signature copy, and one (1) set of pertinent reprints should also be sent to:

Dr. David H. Scott
Discipline Scientist
Planetary Geology and Geophysics Program
Solar System Exploration Division (Code EL)
NASA Headquarters
Washington, DC 20546

2. Proposals of reduced scope for Continuing Work (Progress Proposals) from investigators whose approved multi-year funding (three (3) year maximum) have not terminated. The proposal should include information shown in the suggested Model Format (Enclosure 2, pages 2-5 inclusive), a progress report of the previous year's activity, a work statement, and a detailed budget.

Two (2) copies including an original signature version and one (1) set of pertinent reprints are to be sent to:

Dr. David H. Scott
Discipline Scientist
Planetary Geology and Geophysics Program
Solar System Exploration Division (Code EL)
NASA Headquarters
Washington, DC 20546

Ten (10) copies including six (6) sets of pertinent reprints are to be sent to LPI, with 40 copies of the first four pages:

The Lunar and Planetary Institute
Attention: Lunar and Planetary Geoscience Review Panel
3303 NASA Road 1
Houston, TX 77058

3. Proposals for cartographic work (either for new or continuing work).

Five (5) copies including an original signature version of proposals for new or continuing cartographic work should be sent to:

Joseph M. Boyce
Discipline Scientist
Planetary Geosciences Programs
Solar System Exploration Division (Code EL)
NASA Headquarters
Washington, DC 20546

4. Length of Proposals

It is suggested that each proposal for new work be limited to ten (10) single-spaced, typewritten pages not including title pages, abstract, and budget summary. It is suggested that renewal proposals be limited to five (5) pages and should emphasize progress and accomplishments measured against plans contained in the initial proposal. Any new work that is planned, or work initially planned and not expected to be accomplished, must be highlighted, discussed, and justified.

For both new and renewal proposals, it is suggested that the following material, assembled in the order given, be submitted if appropriate. Other pertinent information, such as publications, etc., should be included as enclosures (see suggested Model Format, Enclosure 2).

B. Cover Letter

Each proposal should be prefaced by a cover letter signed by an official authorized to commit the investigator's organization. The cover letter should refer to the Planetary Geology and Geophysics Program.

C. Title Page (see Model Format pages 2 and 3)

The title page should contain the following:

1. A short descriptive title for the proposed investigation.
2. Date of submission.
3. Names, signatures, full addresses, telephone numbers, and affiliations of the principal investigator and Authorizing Institutional Official.
4. Names of co-investigators and collaborators and their affiliation.
5. Business representative or sponsoring agency official.
6. Additional information if needed.

D. Abstract Page

A brief statement of objectives of the proposed research, progress, and accomplishments of prior year (if continuing research); what will be accomplished this year, as well as how and why; and a summary bibliography showing number of papers, abstracts, maps, oral presentations, etc. that relate to accomplishments or progress of the proposal.

E. Description of Proposed Research

A brief introduction, background, and justification should be included. The description should be a full statement of the research proposed, identifying and relating the key elements. Give attention to the nature and amount of experimental data to be collected; describe the methods or approaches to be used, as appropriate; discuss the advantages of the proposed approach over alternatives; and discuss the significance of the expected results.

F. Cost Plan (U.S. Proposals Only)

Separate budgets should be presented for each year. The proposal should be prepared according to the guidelines of the institution submitting the proposal and should include the following information:

1. Cost estimates for direct labor, including individual man-months and rates for the personnel involved.

2. Estimated costs for materials; itemize all items.

3. Travel costs; itemize trips.

4. Other costs, with explanation. (Include cost of data products. See Section II-H of this enclosure.)

G. Enclosures

Appropriate descriptions of available facilities, bibliographies, and such other materials as desired.

H. Data Requirements

It will be the responsibility of the investigator to acquire required data from the National Space Science Data Center (see Section V, Sources for Information and Data).

Modest requests for imaging and nonimaging data will be supplied free of charge. However, there will be a charge for large requests. Therefore, the proposer should ascertain data requirements for a cost estimate to be included in the proposal budget.

I. Other Federal Support

List, by title, other NASA-funded studies that you receive support from. Include the name of the NASA monitor, current funding level, and a short description of the work. Also, list by title other studies that you receive federal support from (NSF, DOD, etc.) that directly or indirectly relates to your proposal.

J. Disclosure of Proposal Data

It is NASA's policy to use the technical data contained in proposals for evaluation purposes only. Where any of such technical data constitutes a trade secret under the law, and the offeror or his proposed subcontractor desires to maintain trade secret rights in such technical data, the following "Notice" must be affixed to the cover sheet of the proposal specifying therein the pages of the proposal which contain trade secrets to be restricted in accordance with the conditions of the "Notice". Thereafter, it is NASA policy to protect such noticed technical data as a trade secret. NASA assumes no liability for use or disclosure of any technical data to which the Notice has not been applied.

NOTICE

Data on pages _____ of this proposal constitute a trade secret. It is furnished to the government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, in the event a contract is awarded on this proposal, the government may obtain in the contract additional rights to use and disclose this data.

III. GENERAL POLICY

All documents submitted as unsolicited proposals should meet the following criteria before a comprehensive evaluation can be made:

A. The proposal contains sufficient scientific, technical, and cost information to enable meaningful evaluation;

B. The proposal has been approved by a responsible official of the originating or sponsoring organization or person authorized to contractually obligate such an organization;

C. The proposal does not merely offer to perform standard services.

IV. PROPOSALS FROM NON-U.S. ORGANIZATIONS

All non-U.S. proposals should be prepared as described above except no budget information need be included (see Section II) and a copy forwarded to:

International Affairs Division
Code LID (Planetary Geology and Geophysics)
NASA Headquarters
Washington, DC 20546

Proposals should be in English and should be endorsed by the official national agency of the proposer's country which is responsible for space and/or scientific activities. Should a proposal be selected, NASA will arrange with the sponsoring national agency for the proposed participation on a cooperative (no exchange of funds) basis, in which NASA and the foreign sponsoring agency will each bear the cost of discharging their respective responsibilities.

V. SOURCES FOR INFORMATION AND DATA

Investigators should be aware of sources for data which might be used in their research. Before submitting a proposal, each investigator should determine that the required data can be made available. Useful contacts for making these determinations are given below:

A. Data from Completed NASA Flight Programs and Lunar Cartographic Products

Digital and other data from completed flight experiments are stored in the National Space Science Data Center (NSSDC). Data of interest to investigators include: (1) extensive lunar and planetary photographs, (2) digital image data, (3) data from numerous flight science experiments, and (4) lunar cartographic products. Information on the variety, format, and content of material available can be obtained from the NSSDC.

Requests to NSSDC for data products and data product availability information from U.S. investigators should be directed to:

National Space Science Data Center
Code 601
NASA Goddard Space Flight Center
Greenbelt, MD 20771
(301) 344-7345
FTS 344-7345

Requests to NSSDC for data products and data product availability information from non-U.S. investigators should be directed to:

World Data Center A for Rockets and Satellites
Code 601
NASA Goddard Space Flight Center
Greenbelt, MD 20771
U.S.A.

B. Planetary Cartographic Products

A variety of planetary cartographic products such as topographic, orthophotomaps, geological maps, and other special maps and geodetic information are available.

Requests from accepted investigators for production of special maps or other cartographic materials will be accommodated when possible. Available data or specific maps may be obtained from:

Branch of Distribution
U.S. Geological Survey
1200 S. Eads Street
Arlington, VA 22202

C. Regional Planetary Image Facilities

Space Image Centers contain nearly half a million images of the planets and their satellites taken both from Earth and in space, as well as topographic and geologic maps produced from this imagery. The Centers, located at several different institutions, are intended for use by individuals and groups who use photographic and cartographic materials of the Moon and planets in their research programs. These programs include geologic, photometric, colorimetric, photogrammetric, and atmospheric dynamical studies. In addition to the local scientists and their associates who use these data on a daily basis, NASA principal investigators and others elsewhere throughout the country are encouraged to use the Space Image Centers. There are many researchers who use this type of material but have access to only limited collections in their own institutions. These individuals can signficantly enhance their research programs by using one of the Centers.

The Centers are not facilities for the production of photographs for users. Such materials can be obtained from the National Space Science Data Center (address in Maryland). The Centers are used to study and/or select images of lunar and planetary surfaces.

At the present time, the following Centers are operational:

1. Jet Propulsion Laboratory, Pasadena, CA 91109
2. University of Arizona, Tucson, AZ 85721
3. U.S. Geological Survey, Flagstaff, AZ 86001
4. Washington University, St. Louis, MO 63130
5. Cornell University, Ithaca, NY 14853
6. Brown University, Providence, RI 02912
7. Lunar and Planetary Institute, Houston, TX 77058
8. Smithsonian National Air and Space Museum, Washington, DC 20560
9. University of London Observatory, London, NW 7 450, England
10. Dell 'Universita Degli Studi, Piazzale Delle Scienze 00100, Rome, Italy
11. University of Hawaii, Honolulu, HI 96822.
12. DFVLR - OE15, Oberpfaffenhofen D-8031, Wessling, Federal Republic of Germany
13. Universite Paris-Sud (laboratoire de Geologie Dynamique), Orsay, France

Proposers who are interested in making use of these Centers should address inquiries to the Director, Planetary Image Center, at the Center closest to their home institution.

D. General Lunar and Planetary Information

The Lunar and Planetary Institute (LPI) in Houston, Texas, is the most concentrated and readily accessible source of information available on lunar science.

E. Decalibrated Digital Planetary Image Data

Digital planetary image data from past planetary missions are stored at the U.S. Geological Survey (USGS) in Flagstaff, Arizona. As an interim distribution center until the Digital Planetary System is completed by NASA, these data are available in small quantities (less than five decalibrated images) directly from the USGS.

The address of the USGS is:

Planetary Data Facility
Attn: Mrs. Joan D. Swann
U.S. Geological Survey
2255 N. Gemini Drive
Flagstaff, AZ 86001

Requests for more than five decalibrated images should be submitted to:

Joseph M. Boyce
Discipline Scientist
Planetary Geosciences Programs
Solar System Exploration Division (Code EL)
NASA Headquarters
Washington, DC 20546

ENCLOSURE 2

MODEL FORMAT

MODEL TABLE OF CONTENTS

(Please give page numbers)

COVER SHEETS

- o TITLE PAGE
- o OTHER PERSONNEL
- o PROPOSAL SUMMARY WITH ABSTRACT
- o BUDGET SUMMARY

TABLE OF CONTENTS

WORK STATEMENTS

DATA REQUIREMENTS

SUPPORTING FACILITIES

SCIENTIFIC AND TECHNICAL PERSONNEL

BIBLIOGRAPHY

ADMINISTRATIVE AND BUDGETARY INFORMATION

(COVER SHEET)

LOG NO._____

Date Received_____

DO NOT WRITE IN THIS SPACE

SOLAR SYSTEM EXPLORATION DIVISION

PLANETARY GEOLOGY AND GEOPHYSICS PROGRAM

Full Proposal	Progress Proposal	Grant/Contract No.
_____	_____	_____

TITLE:_____

DATE SUBMITTED:_____

PRINCIPAL INVESTIGATOR:_____
(Signature and Date)

_____
(Typed Name)

_____
(Address, including Zip Code)

_____

_____
(Telephone Number, including Area Code)

AUTHORIZING INSTITUTIONAL OFFICIAL:_____
(Signature and Date)

_____
(Typed Name)

_____
(Address, including Zip Code)

_____

_____
(Telephone Number, including Area Code)

CO-INVESTIGATORS AND THEIR AFFILIATIONS:

SCIENTIFIC COLLABORATORS AND THEIR INSTITUTIONAL AFFILIATIONS:

BUSINESS REPRESENTATIVE OR SPONSORING AGENCY OFFICIAL:
(Name, Title, Complete Address, and Telephone Number)

ADDITIONAL INFORMATION IF NEEDED:

PROPOSAL SUMMARY

PRINCIPAL INVESTIGATOR: _____
(Names, Address, _____
Telephone Number) _____

CO-INVESTIGATORS: _____
(Name Only) _____

TITLE: _____

ABSTRACT: (Single-spaced, type within box below. Paragraphs numbered (a) through (d) should include: (a) brief statement of the overall objectives and justification of the work; (b) brief statement of the progress and accomplishments of the prior year, or "new proposal"; (c) brief listing of what will be done this year, as well as how and why; and (d) summary bibliography):

BUDGET SUMMARY

PRINCIPAL INVESTIGATOR:_____

PROPOSAL TITLE:_____

DESIRED STARTING AND ENDING DATES:_____

GRANT, CONTRACT, OR RTOP NUMBER:_____

SUMMARY OF DETAILED BUDGET(S)

1. Salaries and Wages_____
2. Supplies and Materials_____
3. Equipment Purchases_____
4. Computer Time_____
5. Laboratory Rental and Services_____
6. Publication and Communications_____
7. Travel_____
8. Other (including overhead and benefits)_____
9. Total Budget/ 12 Months_____
10. Budget/12 Months_____ Institutional Contribution
11. Budget/12 Months Carryover_____
12. Budget/12 Months_____ New Funding Requested from NASA

13. Estimated Totals to Completion of Research:

Funds:_____ Months:_____

SUMMARY BY TASK: (Approximate breakdown; nearest $K, nearest 0.1 manyear)

Task No.	Abbreviated Title	Funds	Manyears Sen.Res.	Post-Doc.	Stu.	Tech.	Other
1.							
2.							
3.							
4.							
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National Aeronautics and
Space Administration

Washington, D.C.
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16 JUNE 1986

Space Science & Applications Notice

THE EVOLUTION OF VOLCANISM, TECTONISM, AND VOLATILES ON MARS

Sponsored by the Mars Data Analysis Program

NAS1.53/2:

CHECKLIST

- Have you completely filled out the enclosed 3 postal cards on both sides? (1 addressed to the principal investigator and 1 addressed to business representative; the "information copy" is retained by NASA).
- Do the first 4 pages of your proposal consist of the correctly filled in forms provided in this Notice (last four pages)?
- Have you signed the proposal and obtained the signature of an authorizing official in your institution?
- Have you enclosed pertinent reprints of recent papers?
- Have you assembled 1 original and 15 copies of the proposal?
- Have you prepared 6 copies of the first 4 pages of your proposal?
- NOTE: Proposals and enclosures are to be forwarded to:

  Evolution of Volcanism, Tectonism,
  and Volatiles on Mars
  The Lunar and Planetary Institute
  3303 NASA Road 1
  Houston, TX 77058

IF YOUR BUSINESS OFFICE HAS THE RESPONSIBILITY FOR ANY OF THE ABOVE ITEMS, PLEASE SEE THAT THEY ARE AWARE OF THESE INSTRUCTIONS.

National Aeronautics and
Space Administration

Washington, D.C.
20546

Reply to Attn of: EL

Dear Colleague:

This letter calls your attention to a continuing opportunity to participate in the analysis of data returned from Mars by the several spacecraft which have visited that planet. This program of research is sponsored by the Solar System Exploration Division of the Office of Space Science and Applications.

The analysis of data returned from Mars has continued for several years and has resulted in a remarkable expansion of knowledge of the makeup and history of that planet. Previous analyses of Mars data sponsored by NASA have been multifaceted and diverse, and that approach has been successful for it has allowed the scientific community to explore the data and address a variety of problems which appeared to be the most interesting and most worthy of attention. While much remains to be done with these data, two things have happened which make it advisable to change the manner in which the analyses are undertaken and the research is sponsored. First, many of the earlier efforts have converged upon a few sets of topics which appear to have the greatest potential for further study. Second, funds available for analysis are no longer adequate to support a frontal attack on the entire data set.

NASA's response to these circumstances has been to select one or more focused topics for continued data analysis and to channel a major portion of the available funds to support these focused efforts. The underlying concept is that various high priority topics will be addressed sequentially over a period of several years. The initial topic for a focused study selected, with the help of the scientific community, was Volatile Evolution and Climate History of Mars. As this study draws to its conclusion, we move on to a study that changes the emphasis to Volcanism and Tectonism, but retains some of the elements of the previous volatiles study because of its natural connection to volcanism and its importance to Mars Observer.

Plans for administering this study involve not only focusing the effort, but also continuation of a new method of coordinating the individual research tasks which are selected. The approach involves the establishment of a working group consisting of all interested investigators and, through occasional meetings of the group, the coordination of the research efforts.

The organized approach is not intended to coerce any of the participants to redirect their research, but rather to take advantage of the collective wisdom of the participants to guide the study, to identify important areas of research not addressed by proposals, and to encourage voluntary responses to the identified needs.

While this approach remains experimental in the conduct of a research program, I believe that the experience of the previous study indicates that it will contribute significantly to the maturation of our understanding of Mars as a planet. I also feel that this approach will have the beneficial result of placing the responsibility for guiding the research in the hands of those who are scientifically the most knowledgeable.

If you wish to submit a proposal to participate in this program, I suggest that you read the following guidelines with care and that you use the format suggested therein.

Sincerely,

B. I. Edelson
Associate Administrator for
Space Science and Applications

Enclosures

TABLE OF CONTENTS

		PAGE
I.	PURPOSE	1
II.	SCOPE OF PROGRAM	1
III.	GENERAL GUIDELINES	2
	A. NASA Policy on Unsolicited Proposals	2
	B. Disclosure of Proposal Data	2
IV.	SCHEDULE	2
	A. Submission and Review	2
	B. Approval and Awards	3
	C. Study Implementation and Working Group Participation	4
V.	PROPOSAL SCOPE, FORMAT, AND CONTENT	4
	A. Format	4
	B. Technical Information	4
	C. Administrative and Budgetary Information	6
	D. Sponsorship	7
VI.	PROCEDURES FOR SUBMISSION	7
	A. Domestic Proposals	7
	B. Foreign Proposals	8
	C. All Proposers	8
VII.	FURTHER INFORMATION	8
	MODEL FORMATS	

I. PURPOSE

These Guidelines provide procedural and format information for submission of unsolicited proposals for participation in a Mars research program entitled, "Evolution of Volcanism, Tectonism, and Volatiles on Mars," managed by NASA's Solar System Exploration Division of the Office of Space Science and Applications.

II. SCOPE OF THE PROGRAM

Volcanism and tectonism are key processes in the evolution of Mars. However, research dealing with these topics was not implemented in the current program. The Mars Data Analysis Program will, therefore, support scientific investigations in a focused study that will address the volcanic and tectonic evolution of Mars. The program will also support, though at a lower level, investigations to address the volatile evolution of Mars as it relates to volcanism and tectonism. This latter task is included because of its natural connection to volcanism and tectonism, and because of its relevance to Mars Observer.

Examples of some specific tasks to test models of the volcanic and tectonic history of Mars using synthesized data sets (e.g. photogeology, topography, and gravity) are:

1) Determine the locations, characteristics, and relative ages of volcanic materials on the surface; 2) Determine changes in the pattern of faulting with time by such means as cross-cutting structural relations and crater density statistics; 3) From past patterns of faulting and volcanism, attempt to infer past states of stress in the lithosphere and how they have changed with time; 4) Use the stress history within the lithosphere and the volcanic history to place limits on the thickness and other properties of the lithosphere and the thermal history and dynamics of the interior; 5) Examine the nature and possible causes of the global dichotomy on Mars, using imaging, topography, and gravity data; 6) Assess reasons for the contrasting styles of martian and terrestrial volcanism, particularly the apparent longevity and large size of martian volcanoes; 7) Compare the vertical deformation and faulting of broad crustal regions of Mars with broad structural uplifts and basins in the interior of lithospheric plates on Earth.

Examples of some specific tasks that address the volatile evolution of Mars as it relates to volcanism and tectonism are:

1) Determine to the extent possible the composition of volcanic emissions, their current reservoirs, and the processes responsible for their migration to those reservoirs; 2) Investigate the relationship between atmosphere-surface interactions and volcanism during that period of time when morphology suggests a substantially different volatile regime; 3) Determine the effect of quasi-periodic (e.g. axial changes) and episodic process (e.g. volcanism) on the near surface thermal regime, and on the exchange of volatiles among the atmosphere, regolith, and polar caps.

These examples are for illustrative purposes and are not intended to be a complete list of tasks to be supported in the "Evolution of Volcanism, Tectonism, and Volatiles on Mars" Program.

III. GENERAL GUIDELINES

A. NASA Policy on Unsolicited Proposals - Proposers should be aware of the general policy at NASA with respect to unsolicted proposals. Specifically, the NASA Procurement Regulations Part 4, specifies that the initial receiving office, prior to making a comprehensive evaluation of a document apparently submitted as an unsolicited proposal, shall determine that the document: 1) contains sufficient scientific, technical, and cost information to enable meaningful evaluation; 2) has been approved by a responsible official of the proposing organization or a person authorized to contractually obligate such an organization; and 3) does not merely offer to perform standard services or to provide "off-the-shelf" articles. If the document does not meet these requirements, a comprehensive evaluation will not be made and the document will be handled as correspondence.

B. Disclosure of Proposal Data - It is NASA's policy to use the technical data contained in proposals for evaluation purposes only. Where any of such technical data constitutes a trade secret under the law and the offeror, or his potential subcontractor, desires to maintain trade secret rights in such technical data, the following "Notice" must be affixed to the cover sheet of the proposal specifying therein the pages of the proposal which contain trade secrets to be restricted in accordance with the conditions of the "Notice." Thereafter, it is NASA policy to protect such noticed technical data as a trade secret. NASA assumes no liability for use or disclosure of any proposal technical data to which the "Notice" has not been applied.

The text of the "Notice" is as follows:

> Data on pages ..... of this proposal constitute a trade secret. It is furnished to the government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes, provided however, in the event a contract is awarded on this proposal the government may obtain in the contract additional rights to use and disclose this data.

IV. SCHEDULE

A. Submission and Review - The Mars Data Analysis Program is an open and continuing program to which unsolicited proposals may be submitted at any time. In order to make the best use of resources, however the review of proposals is undertaken only once each year in September.

Proposals received by NASA before September 1986 will be reviewed in October 1986 by a panel composed of the proposers' peers. In their deliberation, the reviewers will consider the need for the proposed work, the soundness of proposed approaches, the proposers' understanding of the research area, the originality of the proposed work, the competence and skills of the proposer and team, the quality of past work, and the adequacy of the proposers' facilities. The panel will provide NASA with summary reviews of each proposal and a recommendation as follows:

I. Highly recommended - Excellent science, highly appropriate to this study.

II. Recommended - Good science, highly appropriate to this study.

III. Not Recommended - Inappropriate to this study or quality of science not acceptable.

Selection of proposals for participation in the program will be made by NASA based on the reviews and on availability of funds. Proposers will be notified of the results of the review and selection process by October 1986.

Generally, it will not be possible to evaluate proposals received after early September 1986, until the next review cycle. Proposers will be notified and the proposal will be held for review in September 1986 unless otherwise directed by the proposer.

B. Approval and Awards - Proposals which are selected will normally have a starting date in January of the following year. All awards will be made from NASA Headquarters.

Proposals may be submitted which request support for periods of performance of one or more years. However, proposals which are approved and can be funded within the available budget, will normally result in awards that are for a period not in excess of 12 months. Renewal proposals are required for all subsequent year funding.

Proposals which are selected may be selected for one year approval only, or for longer periods (two or three years) under "continuing award" agreements which provide for reduced requirements for second and, where appropriate, third year renewal proposals. In these cases, but only if he or she has been so informed, an investigator may elect to rely on the scientific/technical evaluation of his or her original proposal and may submit an abbreviated renewal proposal for the second or third year of a two- or three-year effort.

The abbreviated proposal will consist only of a progress report, a brief work statement, updated cost information, and copies of papers resulting from the previous year's effort. The original proposal and its evaluation will be considered together with the progress report and updated cost information to determine if an extension is

warranted. Awards for renewal funding for the extension are generally subject to the availability of funds, the continued relevance to NASA's programs, and a demonstration of satisfactory prog_ess on the prior effort.

Selection for one-year, two-year, or three-year approvals will be based on criteria such as quality of the proposed research, demonstrated ability of the investigator, scope of the proposed study, and the optimum phasing of the proposed research in a focused study of finite (approximately three years) duration.

C. Study Implementation and Working Group Participation - Principal Investigators of proposals that are accepted will automatically become members of the Mars: Evolution of Volcanism, Tectonism, and Volatiles Working Group. A special meeting of this Working Group will be held after awards have been made, most likely coincident with a national meeting. At that meeting the Principal Investigators (Working Group members) will:

- o select Working Group coordinators or officers;
- o identify ke· problems to be addressed at study sponsored workshops;
- o ascertain how the problems are being addressed;
- o identify key issues not addressed and make "remedial" recommendations: and
- o develop a plan for coordinating the efforts of individual researchers.

A staff scientist of the Lunar and Planetary Institute will be assigned to the Working Group to provide scientific liaison, communication, planning, and management assistance.

V. PROPOSAL SCOPE, FORMAT, AND CONTENT

A. Format - Models for a proposal cover sheet, abstract sheet, personnel sheet, and budget summary are enclosed. The use of these sheets (or copies thereof) is encouraged. For more efficient logging and handling of proposals, it is requested that no additional covers, binders, etc., be used in front of the model cover sheets.

B. Technical Information -

1. TITLE - The title should be informative, detailed, and as brief as possible.

2. ABSTRACT - The abstract should be prepared in a final, camera-ready form. The "Proposed Summary" (page 3 of the four model sheets) should be used for this purpose. The abstract should be typed single-spaced and within the box drawn on the model sheet. Paragraphs a. through d. should include the following:

   a. a brief statement of the overall objective and justification of the work:

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Space Administration

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NASA 451

INFORMATION COPY

PRINCIPAL INVESTIGATOR: _____

INSTITUTION: _____

TITLE: _____

.....

PRINCIPAL INVESTIGATOR: _____

INSTITUTION: _____

TITLE: _____

.....

PRINCIPAL INVESTIGATOR: _____

INSTITUTION: _____

TITLE: _____

b. a summary of accomplishments during the period since the last proposal (for new proposals, simply state "New Proposal");

c. a brief listing of work to be accomplished during the award period and of the approach to be used; and

d. a bibliography of one or a few recent publications by the proposer that are relevant to the study proposed.

3. WORK STATEMENT - This section describes and justifies the proposed research. It should be as clear and concise as possible. The scientific objectives and significance of the investigation should be described briefly. Its relevance to the study goals must be made clear. This material should be followed by a succinct but clear discussion of the approach to be followed. When possible, each proposal should be divided into separate tasks that can be conducted independently. These tasks should be enumerated and described. If the investigation cannot be completed within the 12-month period of the award, the work statement should contain a brief description of work plans for each year of the effort. It is suggested that the length of the work statement should not exceed ten (10) pages.

4. DATA REQUIREMENTS - It is the responsibility of the proposer to document that data necessary for the investigation are available in a form that can be readily utilized. If there are any unusual requirements for data, or for processing of data by NASA, those requirements must be clearly identified so that NASA can determine whether or not the data, or their processing, can be supplied.

There are several sources of data which might be needed for proposed investigations.

a. Data from Completed NASA Flight Programs - Data from completed flight experiments are stored in the National Space Science Data Center (NSSDC). Data of interest to investigators include: (1) digital and hard copy image data, and (2) data from flight science experiments. Information on the variety, format, and content of material available can be obtained from:

National Space Science Data Center
Code 601
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, MD 20771
Phone (301) 344-7354

b. Data from Prior NASA Research Programs - NASA encourages publication of the results of each of their sponsored research tasks. Thus, the information gained through these studies is generally available in the open literature.

5. SUPPORTING FACILITIES - Laboratories, specialized equipment, etc., available for use in the research should be described. Equipment which is proposed to be purchased with NASA funds should be specified and justification should be given for the purpose.

6. SCIENTIFIC AND TECHNICAL PERSONNEL - For each participant in the proposed work, the level of effort should be listed in approximate percentage of time. A brief summary of the scientific background and relevant experience of the Principal Investigator (PI), and of each Co-Investigator (Co-I), must be given.

   a. PI - The proposal must designate a PI who is responsible for the primary direction of the investigation. NASA will accept only one PI for a given research effort and will not accept "Acting PI's" or "Co-PI's".

   b. Co-I - This title should be restricted to a limited number of well-qualified scientists who will be contributing materially to the research and who would be capable of independently directing the proposed research.

   c. Scientific Collaborators - All qualified scientists whose work on the research will be sponsored by NASA funds should be listed.

7. BIBLIOGRAPHY - This section should list all publications by the PI and Co-I's that are relevant to the proposed research.

C. Administrative and Budgetary Information -

1. BUDGET SUMMARY - A budget summary (not necessary for non-U.S. proposals) should be given in the format supplied and should be included as page 4 of each proposal. Items 1 through 8 in the summary are straightforward. Item 9 is the total budget required to conduct the research for one year. Item 10 is the institutional contribution toward the total in Item 9, if any. Item 11 is the estimated carry-over money from previous year awards for Mars Data Analysis Program work that will remain uncommitted at the end of the current award period (zero (0) for new projects or proposals). Item 12 is simply Item 9 less the sum of Items 10 and 11, and is the estimated amount of new funds required from NASA to carry out the proposed research for one year. Item 13 is the total estimated amount of money and time required to carry the research to completion, if a multiyear effort is proposed. (NASA support of the complete effort will be contingent on the submission and acceptance by NASA of follow-on proposals.)

2. DETAILED BUDGET - The detailed budget (not necessary for non-U.S. proposals) should itemize expenses in each of the categories listed on the Budget Summary sheet in sufficient

detail to allow meaningful evaluation of costs. If sufficient detail is not provided, evaluation of the proposal will be postponed until such information is available. The budget should give the total funds requested from NASA during the award period (generally 12 months). In the event that multiyear research is proposed, a detailed budget for the entire effort should be given.

3. INVESTIGATIONS AT OTHER INSTITUTIONS - When scientific coinvestigators or collaborators are not employed by the sponsoring institution but are to be funded through this award, evidence of their commitment should be provided.

4. SOURCES OF OUTSIDE SUPPORT - The proposal should list other supported research conducted by the PI, name of sponsor, title of the research, and the level of funding received. There should be a similar listing for each Co-I who is to contribute to the research. The list should include proposals for support that are currently under consideration.

5. DATES - The proposal should include the date of its preparation or submission and the proposed starting data of the research, if there is a valid reason why a January starting date causes a problem.

D. Sponsorship -

1. DOMESTIC PROPOSALS - Investigators are normally sponsored by an educational institution, a corporation, or a research organization which must endorse the proposal forwarded to NASA. Space is provided on the supplied cover sheet for that purpose.

2. FOREIGN PROPOSALS - Investigators from outside the United States should obtain prior endorsement from the official sponsoring agency of their government; such endorsement (see VI. B.) is required for evaluation of the proposals.

VI. PROCEDURES FOR SUBMISSION

A. Domestic Proposals - Each proposal should be submitted with a covering letter signed by an official of the proposer's sponsoring organization who is authorized to commit the organization to the proposal and its contents.

The proposals are to be sent to an address which is different from that given in the instructions for other NASA programs which consider unsolicited proposals. All proposals to the Mars Data Analysis Program for participation in the Evolution of Volcanism, Tectonism, and Volatiles on Mars study should be mailed to:

Evolution of Volcanism, Tectonism, and
Volatiles on Mars Study Proposal Review
The Lunar and Planetary Institute
3303 NASA Road 1
Houston, TX 77058

Sixteen (16) copies of the proposal, including one original signature copy, are required. Additionally, six (6) copies of the first four (4) pages (in the format suggested) should also be enclosed.

B. Foreign Proposals - Foreign proposals received by NASA go through the same evaluation and selection process as U.S.-originated proposals. Should a foreign responder be selected, NASA will arrange with the sponsoring foreign agency for the proposed participation on a cooperative (no exchange of funds) basis. NASA will supply the needed data, but the sponsoring foreign agency must bear the cost to support the research, including any travel required.

Proposals by individuals outside of the United States should be submitted in the format prescribed in Section V. Because foreign participation is not NASA-funded, budget information need not be included in the proposal. All proposals must be reviewed and endorsed by an appropriate sponsoring agency in the proposer's country. Both proposal and endorsement should be in English (the original plus one copy), and should be forwarded to:

International Affairs Division
Code LID (Mars Data Analysis Program)
National Aeronautics and Space Administration
Washington, DC 20546
U.S.A.

Fifteen (15) review copies of the proposal (which need not bear original signatures) should be mailed directly to the Lunar and Planetary Institute, addressed as shown in VI. A.

C. All Proposers - A sheet with postcards imprinted on it has been attached to the Guidelines. The cards will be used to acknowledge the receipt of your proposal by NASA. Please type the name and complete address of the Principal Investigator on the front of one card. One card should be addressed to the appropriate business representative. The final portion of the sheet, "information copy," is for our records. IT IS EXTREMELY IMPORTANT THAT YOU COMPLETE BOTH SIDES OF THIS SHEET AND RETURN IT WITH YOUR PROPOSAL in order to expedite notification of the receipt of your proposal and our management of it.

VII. FURTHER INFORMATION

Questions concerning submission of proposals to the Evolution of Volcanism, Tectonism, and Volatiles on Mars project should be addressed to:

Mr. Joseph Boyce
Discipline Scientist, Planetary Geosciences Programs
Code EL-4
National Aeronautics and Space Administration
Washington, DC 20546

MODEL TABLE OF CONTENTS

(Please give page numbers)

COVER SHEETS

- o TITLE PAGE
- o OTHER PERSONNEL
- o PROPOSAL SUMMARY WITH ABSTRACT
- o BUDGET SUMMARY

TABLE OF CONTENTS

WORK STATEMENT

DATA REQUIREMENTS

SUPPORTING FACILITIES

SCIENTIFIC AND TECHNICAL PERSONNEL

BIBLIOGRAPHY

ADMINISTRATIVE AND BUDGETARY INFORMATION

(COVER SHEET)

LOG NO._____

Date Received_____

DO NOT WRITE IN THIS SPACE

SOLAR SYSTEM EXPLORATION DIVISION

EVOLUTION OF VOLCANISM, TECTONISM, AND VOLATILES ON MARS

TITLE:_____

DATE SUBMITTED:_____

PRINCIPAL INVESTIGATOR:_____
(Signature and Date)

_____
(Typed Name)

_____
(Address, including Zip Code)

_____

_____
(Telephone Number, including Area Code)

AUTHORIZING INSTITUTIONAL OFFICIAL:_____
(Signature and Date)

_____
(Typed Name)

_____
(Address, including Zip Code)

_____

_____
(Telephone Number, including Area Code)

CO-INVESTIGATORS AND THEIR AFFILIATIONS:

SCIENTIFIC COLLABORATORS AND THEIR INSTITUTIONAL AFFILIATIONS:

BUSINESS REPRESENTATIVE OR SPONSORING AGENCY OFFICIAL:
(Name, Title, Complete Address, and Telephone Number)

ADDITIONAL INFORMATION IF NEEDED:

PROPOSAL SUMMARY

PRINCIPAL INVESTIGATOR: _____
(Names, Address, _____
Telephone Number) _____
_____

CO-INVESTIGATORS: _____
(Name Only) _____

TITLE: _____ _____

ABSTRACT: (Single-spaced, type within box below. Paragraphs numbered a. through d. should include: a. brief statement of the overall objectives and justification of the work; b. brief statement of the accomplishments of the prior year, or "new proposal"; c. brief listing of what will be done this year, as well as how and why; and d. one or two of your recent publications relevant to the proposed work.):

BUDGET SUMMARY

PRINCIPAL INVESTIGATOR: _____

PROPOSAL TITLE: _____

DESIRED STARTING AND ENDING DATES: _____

GRANT, CONTRACT, OR RTOP NUMBER: _____

SUMMARY OF DETAILED BUDGET(S)

1. Salaries and Wages _____
2. Supplies and Materials _____
3. Equipment Purchases _____
4. Computer Time _____
5. Laboratory Rental and Services _____
6. Publication and Communications _____
7. Travel _____
8. Other (including overhead and benefits) _____
9. Total Budget/12 Months _____
10. Budget/12 Months - Institutional Contribution _____
11. Budget/12 Months - Carry-over _____
12. Budget/12 Months - New Funding Requested from NASA _____
13. Estimated Totals to Completion of Research:

    Funds: _____ Months: _____

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NASA
National Aeronautics and Space Administration

30 October 1986

Space Science & Applications Notice

URANUS DATA ANALYSIS PROGRAM

NAS1.53/2:

NASA
National Aeronautics and
Space Administration
Washington, D.C.
20546

Reply to Attn of EL

Dear Colleague:

This letter calls your attention to a continuing opportunity to participate in the Voyager Uranus Data Analysis Program (UDAP). The objective of this program is to enhance the scientific return from the mission by broadening the scientific participation in the analysis of Voyager Uranus data. To accomplish this objective, scientists not previously involved in the Voyager Uranus mission, as well as those who have participated as part of the Voyager Uranus flight team, are encouraged to submit proposals. Specific attention is called to the fact that scientists currently involved in the Voyager program who wish to enhance their support for analysis of Uranus data beyond the proprietary period must submit proposals in response to this notice. All proposals will be peer-reviewed following the procedures described in Enclosure C.

For the purposes of UDAP, the Voyager Uranus program is defined as beginning on November 4, 1985, at the start of the observatory phase of the Uranus encounter and ending on February 25, 1986 at the termination of the post-encounter phase. Closest approach to Uranus took place at 1759 UTC on January 24, 1986 at which time the spacecraft flew within 107,000 kilometers of the center of the planet. Throughout the entire Uranus encounter period the goals of the mission were to study the Uranian atmosphere, magnetosphere, ring system, and satellites. Enclosure A includes a list of the Voyager scientific instrumentation and the associated Principal Investigators. Additional information on the Voyager Uranus mission, instrumentation, and scientific results to date may be found in the references listed in Enclosure B. The Voyager Uranus data will be in the public domain as of February 1, 1987.

If you or your colleagues are interested in participating in the Voyager Uranus Data Analysis Program, you may wish to submit an unsolicited proposal describing your planned investigation. Investigators can participate in the program in either one of two ways: Data Analysis (analysis of Voyager Uranus data) or Correlative Studies (correlation of Voyager Uranus data with data obtained from another source). These approaches, and the means of data access under each, are described in Enclosure C.

READEX FICHE best copy available

Proposals should be clearly defined investigations of limited scope, with a duration not to exceed three years. Selected proposals can be funded initially for only one year or less. Commitments by NASA for support beyond one year cannot be made. However, when it is anticipated that the work will require more than one year to complete, a brief description of the entire effort should be included along with the total estimated budgets. In those cases where proposals are accepted for a period of performance longer than one year, brief renewal proposals will be required to obtain second or third year funding.

It is anticipated that approximately $2.5 million per year will be available for UDAP. It is estimated that 30 to 50 investigations will be supported.

Guidelines for preparing and submitting proposals are provided in Enclosure C.

In order to be considered for FY 1987 funding, proposals should reach NASA Headquarters by mid-January 1987. We anticipate that review and selection will be completed in February 1987 with funds to be awarded by May 1987.

Questions regarding this program may be addressed to the Uranus Data Analysis Program Scientist, Dr. William L. Quaide, at the following address and telephone number:

Dr. William L. Quaide
Code EL
NASA Headquarters
Washington, DC 20546
Telephone: (202) 453-1596

Sincerely,

B. I. Edelson
Associate Administrator for
Space Science and Applications

5 Enclosures

TABLE OF CONTENTS

Appendix A - Voyager Mission 1-4

Appendix B - References 1

Appendix C - Guidelines for Participation 1-6

Appendix D - Voyager Uranus Principal Investigators 1-2

Appendix E - Research and Technology Resume 1-2

ENCLOSURE A

I. Voyager Mission

Two Voyager spacecraft were launched toward Jupiter and Saturn along complementary trajectories in August and September 1977. The closest approach dates at Jupiter were March 5, 1979, for Voyager 1 and July 9, 1979, for Voyager 2. The two spacecraft were then directed to Saturn with the dates of closest approach being November 12, 1980, and August 25, 1981, respectively. Voyager 1's trajectory past Saturn was selected to give a close encounter with Titan. This selection placed Voyager 1 on a post-Saturn-encounter trajectory directed both out of the solar system and out of the plane of the ecliptic. Voyager 2's trajectory past Saturn was selected to allow a flyby of Uranus in January 1986 followed by a flyby of Neptune in August 1989.

II. Uranus Encounter

The Voyager Uranus mission was divided into four phases starting 80 days prior to closest approach and extending 30 days past closest approach. For the Jupiter and Saturn encounters, a phase change indicated a change in the level or type of sequence activity. For Uranus, however, the higher encounter velocities and smaller disk sizes gave rise to the use of different criteria for phase boundaries, the phases being established from a desire to split the encounter into segments with approximately equal activity.

The first or observatory phase began on November 4, 1985, when the spacecraft was approximately 103,000 kilometers from Uranus, and the final or post-encounter phase terminated on February 25, 1986, when the spacecraft was approximately 41,000 kilometers beyond the planet. The flyby trajectory near Uranus is shown in Figure A-1. Voyager approached Uranus from the sunward side on a trajectory almost perpendicular to the satellite equatorial plane so that the ring plane crossing and closest approach to Uranus and all of the satellites occurred within a period of less than six hours. The closest approach distances were:

Uranus	107,000	kilometers
Miranda	29,000	"
Ariel	127,000	"
Umbriel	325,000	"
Titania	365,000	"
Oberon	471,000	"

After passing Uranus, the spacecraft underwent Earth occultation for 1 hour and 26 minutes, and solar occultation for 1 hour and 19 minutes.

III. Voyager Spacecraft

The scientific payload of the Voyager spacecraft consists of 11 investigations (10 payload instruments and the spacecraft two-way radio communications link).

Table 1 below briefly lists the investigations and some of their Uranus encounter objectives. The Space Science Review article referenced in Enclosure B provides substantially more details about the investigations.

VOYAGER SCIENCE INVESTIGATIONS

Table 1. Scientific investigations for the Voyager Mission.

Investigation*	Abbreviation	Typical Uranus Encounter Objectives
Imaging science (B. A. Smith)	ISS	High-resolution reconnaissance over large phase angles: atmospheric dynamics: geologic structure of satellites; distribution of material in the rings and ring plane.
Infrared radiation (R. A. Hanel)	IRIS	Atmospheric composition, thermal structure, and dynamics: satellite surface composition and thermal properties.
Photopolarimetry (A. L. Lane)	PPS	Atmospheric aerosols: satellite surface texture: ring composition and radial distribution.
Radio science (G. L. Tyler)	RSS	Atmospheric and ionospheric structure, constituents, and dynamics: ring radial structure and particle size distribution.

Ultraviolet spectroscopy (A. L. Broadfoot)	UVS	Upper atmospheric composition and structure: auroral processes: hydrogen corona extent and distribution: ring UV scattering properties and optical depths.
Magnetic fields (N. F. Ness)	MAG	Planetary magnetic field: magnetospheric structure: interaction of satellites and rings with their magnetosphere/solar wind environments.
Plasma particles (H. S. Bridge)	PLS	Magnetospheric ion and electron distribution: solar wind interaction with Uranus: ions of interstellar origin.
Plasma waves (F. L. Scarf)	PWS	Plasma electron densities: wave-particle interactions: ring associated plasma signal.
Planetary radio astronomy (J. W. Warwick)	PRA	Polarization and spectra of radio requency emissions: plasma resonances: satellite radio emission relationships.
Low-energy charged particles (S. M. Krimigis)	LECP	Distribution, composition, and flow of low energy ions and electrons: temporal and positional variation of galactic cosmic rays.
Cosmic ray particles (E. C. Stone)	CRS	Distribution, composition, and flow of high-energy trapped nuclei: energetic electron spectra.

*The Principal Investigator or Team Leader is indicated in parenthesis.

All of the instruments were operational for the Uranus encounter with the exception of the PPS which suffered a decoder logic hardware problem and only allowed access to three-filter positions (2650, 5900, and 7500 Angstroms) and four analyzer positions (45, 60, 120, 135 degrees).

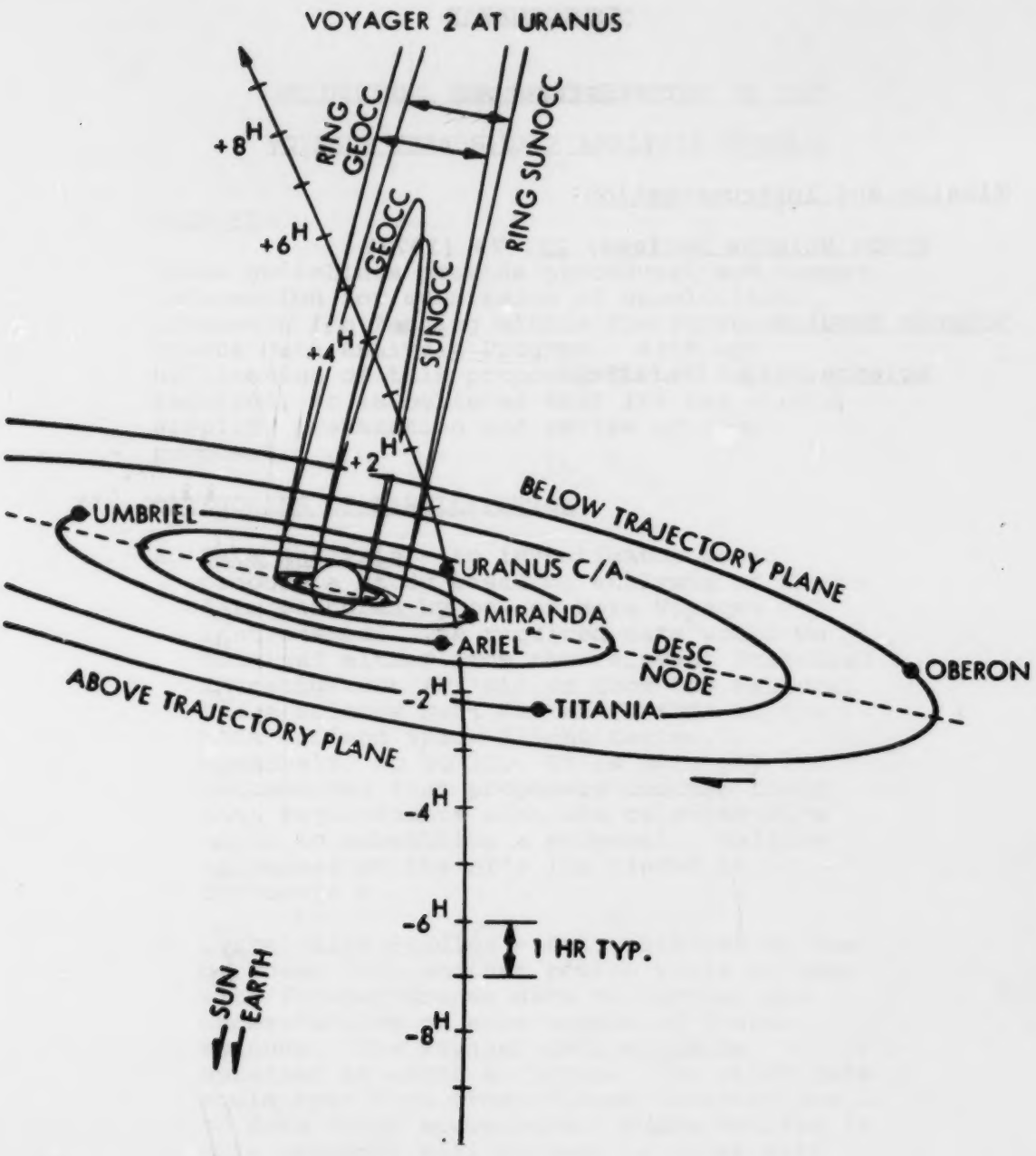


Figure A-1 View looking down from above the Uranus system in a direction perpendicular to the plane of the Voyager-2 trajectory. Most of the "action" takes place within a few hours about closest approach

ENCLOSURE B

References

Mission and Instrumentation

Space Science Reviews, 21, 75 (1977)

Science Results

Science, 233, 39 (1986)

ENCLOSURE C

GUIDELINES FOR PARTICIPATION IN THE

VOYAGER URANUS DATA ANALYSIS PROGRAM

I. PURPOSE:

These guidelines provide procedural and format information for submission of unsolicited proposals for funding within the Voyager Uranus Data Analysis Program. Although utilization of this proposal format is not required, it is believed that its use should simplify preparation and review of your proposal.

II. CATEGORIES OF PARTICIPATION

A. Data Analysis - An investigator would propose a study based on analysis of Uranus data gathered by one or more Voyager instruments. The required data would be obtained either from the relevant Principal Investigators (PI's), or from the National Space Science Data Center (NSSDC) at the NASA Goddard Space Flight Center, Greenbelt, MD 20771. It is strongly recommended that proposers discuss their data requirements with the relevant PI's prior to submitting a proposal. Mailing addresses of the PI's are listed in Enclosure D.

B. Correlative Studies - Data obtained by the proposer from another source would be used with Voyager Uranus data to further the understanding of some aspect of Uranus science. The Voyager data would be obtained as under A. above. The other data could come from ground-based observations or from other spacecraft. Funds awarded in this category will be used to cover data analysis and expenses involved in collaborating with Voyager Uranus investigators; funds will not be authorized for taking new observations or for support of observing facilities.

III. SCHEDULE

The Voyager Uranus Data Analysis Program is contemplated to last three years. Proposals submitted for participation in the program will be reviewed at least once per year in the manner described in Section IV of this Enclosure. The next review is planned for the first quarter of 1987, with subsequent reviews held at twelve-month periods thereafter. In order to be considered for FY 1987 funding, proposals should reach NASA Headquarters by mid-January 1987.

IV. PROPOSAL REVIEW AND PROGRAM IMPLEMENTATION

Proposals will be reviewed by a peer group under the chairmanship of the NASA Headquarters Program Scientist. The Voyager Project Scientist and other peers in the scientific community will participate in the review as required. Discussion with the relevant PI's prior to proposal submission is suggested in order to minimize submission of nonfeasible proposals. The Voyager Uranus Data Analysis Program will be directed by NASA Headquarters.

V. PROPOSAL CONTENT AND FORMAT

The content of the proposal should be in sufficient detail so that a reviewer can make a judgement with respect to: (1) the relevance of the proposed research to the Data Analysis Program and to the objectives of the Voyager Uranus Mission; (2) the probability that the investigators will be able to accomplish the stated objectives within the requested resources; and (3) its overall value to the Solar System Exploration program. Proposals will also be reviewed in the context of previous and existing programs to minimize duplication of effort.

It will be helpful if each proposal is limited to not more than ten single-spaced, typewritten pages (excluding cost plan and enclosures), and contains at least the following material assembled in the order given:

A. Title Page - The title page should contain the following:

1. A short descriptive title for the proposed investigation. The title should refer to the Voyager Uranus Data Analysis Program.

2. Name of the proposing organization(s).

3. Names, full addresses, telephone numbers, and affiliations of the Principal Investigator and all Co-Investigators.

4. Date of submission.

5. Total cost.

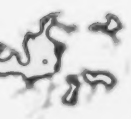
6. Signatures. Each proposal must be signed by an official of the investigator's organization who is authorized to commit the organization to the proposal and its contents.

B. Description of Proposed Research - A brief introduction, background, and justification should be included. The description should be a full statement of the research proposed, identifying and relating the key elements to the Voyager Uranus mission. Give special attention to the two categories of participation described in Section II, and explain in detail the requirements to support your participation in a particular category.

Specify as completely as possible the nature and amount of data required to support your participation and indicate what discussions have taken place with the relevant PI's. Include a full discussion, including cost impact, of any special data processing that might be required of the PI or the Voyager project in preparing the data set for your investigation.

Selected proposals can be funded initially for only one year or less; commitments made by NASA for support beyond one year cannot be made. However, when it is expected that the research will require a second or third year to complete, the proposal should cover the complete project to the extent that it can be reasonably anticipated.

Renewal proposals, which are required to obtain second or third year funding for these proposed activities which are selected for multiyear efforts, can be relatively brief. They must, however, include: a report of progress made during the previous year, a statement of work for the second or third year, a cost plan, and an updated T-43 (Research Resume) form.



C. Cost Plan (U.S. Proposals Only) - Prepared according to the guidelines of the institution submitting the proposal and including:

1. Cost estimates for direct labor, including individual man-months and rates for the personnel involved.

2. Estimated costs for computer services, including type of computer and number of hours, equipment, and materials. Itemize items over $500.

3. Travel costs. Itemize trips.

4. Overhead rates and costs.

5. Other costs, with explanation.

6. Contribution from any cost-sharing plan.

7. Total cost of support being requested from NASA.

D. Enclosures - Appropriate descriptions of available facilities, bibliographies, data, and other materials as desired.

E. Research Resume (Form T-43) - Enclosure E of this announcement should be completed to provide a one-page summary of the proposed research and budget requirements.

F. General Policy - It is NASA policy that the initial receiving office, prior to making a comprehensive evaluation of a document apparently submitted as an unsolicited proposal, shall determine that the document:

1. Contains sufficient scientific, technical, and cost information to enable meaningful evaluation;

2. Has been approved by a responsible official of the originating or sponsoring organization, or a person authorized to contractually obligate such a organization; and

3. Does not merely offer to perform standard services or to provide "off-the-shelf" articles.

If the document does not meet these requirements, comprehensive evaluation will not be made, and the document will be considered and handled as correspondence.

VI. PROPOSAL SUBMISSION INFORMATION

Ten (10) copies of the proposal should be submitted. One copy should be clear, black on white paper, of a quality suitable for reproduction. Proposals for participation by individuals outside of the United States must be submitted in the same format (excluding cost plans) as U.S. proposals. They should be typewritten in English. Proposals in response to this Notice, originating in the United States, should be sent to:

Dr. William L. Quaide
Program Scientist, Voyager Uranus
Data Analysis
Code EL
NASA Headquarters
Washington, DC 20546

Foreign proposals should be sent to:

International Affairs Division
Code LID (Voyager Uranus)
NASA Headquarters
Washington, DC 20546
USA

Foreign proposers must have their proposals reviewed and endorsed by the appropriate foreign government agency. Foreign proposals received by the NASA International Affairs Division will go through the same evaluation and selection process as U.S. originated proposals. In the case where a foreign proposal is selected, NASA will arrange with the sponsoring foreign agency for the proposed participation on a cooperative (no exchange of funds) basis, in which NASA and the sponsoring agency will each bear the costs of discharging their respective responsibilities, including travel and subsistence for its own personnel.

VII. DISCLOSURE OF PROPOSAL DATA

A. Commercial and Financial Data

1. It is NASA's policy to use commercial and financial data included in unsolicited proposals for evaluation purposes only. This policy does not require that this kind of proposal data bear a notice.

2. Where it is the practice of an offeror or his proposed subcontractor to treat certain commercial and financial data as a trade secret, and such data is protectable as a trade secret

under law, he may apply the "Notice" of Paragraph B below to those portions to be maintained as a trade secret.

3. In any event, commercial and financial data submitted to NASA in an unsolicited proposal will be protected to the extent permitted under the law, either as a properly noticed trade secret, or as commercial or financial information received from a person as confidential or privileged.

B. Technical Data

It is NASA's policy to use the technical data contained in unsolicited proposals for evaluation purposes only. Where any of such technical data constitutes a trade secret under the law and the offeror, or his potential subcontractor, desires to maintain trade secret rights in such technical data, the following "Notice" must be affixed to the cover sheet of the proposal specifying therein the pages of the proposal which contain trade secrets to be restricted in accordance with the conditions of the "Notice." Thereafter, it is NASA's policy to protect such noticed technical data as a trade secret. NASA assumes no liability for use or disclosure of any proposal technical data to which the "Notice" has not be applied.

NOTICE

Data on pages _____ of this proposal constitute a trade secret. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided however, in the event a contract is awarded on this proposal, the Government may obtain in the contract additional rights to use and disclose this data.

ENCLOSURE D

VOYAGER URANUS PRINCIPAL INVESTIGATORS

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Tucson, AZ 85721

Rudolph A. Hanel
Code 690
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, MD 20771

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Applied Physics Laboratory
Johns Hopkins University
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Laurel, MD 20810

Arthur L. Lane
MS 264-626
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Pasadena, CA 91109

Norman F. Ness
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G. Leonard Tyler
Center for Radar Astronomy, Durand 213
Stanford University
Stanford, CA 94305

James W. Warwick
Radiophysics, Incorporated
5475 Western Avenue
Boulder, CO 80301

ENCLOSURE E

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION **RESEARCH AND TECHNOLOGY RESUME**						1. DATE PREPARED
2. TITLE				3. NUMBER/CODE a. PROPOSAL		b. CURRENT
4. PERFORMING ORGANIZATION				5. CONTRACT/GRANT NO. 6. DATE a. STARTING		b. ANNIVERSARY
7. INVESTIGATOR'S NAME / TEL. NO.	FISCAL YEAR	STATUS	MANPOWER (MY)		FUNDING (In K)		
8. NASA ALT. TECH MONITOR'S NAME / TEL. NO.		a.	IN-HOUSE b.	S/C c.	IMS d.	R/D e.	TOTAL f.
	10. PRIOR						
9. INSTITUTION CATEGORY CODE	11. CURRENT						
	12. BUDGET						

13. DESCRIPTION *(a. Brief statement on strategy of investigation; b. Progress and accomplishments of prior year; c. What will be accomplished this year, as well as how and why; and d. Summary bibliography)*

TECHNICAL MONITOR	TYPED NAME AND SIGNATURE	DATE
APPROVING OFFICIAL	TYPED NAME AND SIGNATURE	DATE

NASA FORM T43 DEC 74 REPLACES NASA FORM T8 WHICH IS OBSOLETE.

INSTRUCTIONS

1. DATE PREPARED. – Self-explanatory.

2. TITLE. – Self-explanatory.

3. NUMBER/CODE. – a. Enter proposal number if research is conducted out of NASA; b. Enter 11-digit code for this task. The first five digits equate to the RTOP number under which this work is being performed.

4. PERFORMING ORGANIZATION. – Enter institution name, city and State, including ZIP Code.

5. CONTRACT/GRANT NO. – Enter the contract or grant number, including Arabic prefix.

6. DATE. – a. Enter month and year this work was initiated; b. Enter month and year the present contract or grant expires.

7. INVESTIGATOR'S NAME. – Enter name and two initials and the telephone number. Specific titles; e.g., Dr., Prof., etc., are not to be used.

8. NASA ALTERNATE TECHNICAL MONITOR. – Enter name and two initials, without title, and telephone number.

9. INSTITUTION CATEGORY AND CODE. – Enter institutional category code where research is being performed; e.g., UN = University, UM = University Medical School; NP = Nonprofit; IN = Industrial; FC = Field Center, and OT = Other Government.

10-12. PRIOR, CURRENT, BUDGET. – Complete each of these line items *(Prior 75; Current 76, and Budget)* to show the following FY 1976 information:

a. Status. – Enter status of research during each particular year; e.g., C = Continuing research; N = New; and F = Completed.

MANPOWER *(MY)*. – Enter manpower equipment to one-tenth of a man year for each year for:

b. In-house. – In-house Civil Service.

c. S/C. – Support Contractor.

FUNDING. – Enter all funding data in thousands for the following:

d. IMS. – Institutional Management System.

e. R/D. – Research and Development.

f. Total. – The sum of columns d and e for each of the Prior, Current and Budget FY's.

13. DESCRIPTION. – Brief statement including the justification and progress as to this particular task and the necessity for supporting this work. Material in this section should not duplicate justification, and so forth, in the RTOP. Paragraphs should be numbered a through d as outlined.

14. TECHNICAL MONITOR. – Enter last name, two initials and signature of NASA Technical Monitor and the date.

15. APPROVING OFFICIAL. – Enter last name, two initials, signature and date.

*U.S. GOVERNMENT PRINTING OFFICE: 1986-181-547:40029

National Aeronautics and
Space Administration

Washington, D.C.
20546

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November 7, 1986

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Space Science & Applications Notice

SOLAR MAXIMUM MISSION

GUEST INVESTIGATOR PROGRAM

NAS 1.53/2:

NASA
Space Science and Applications Notice

TABLE OF CONTENTS

FOR

SOLAR MAXIMUM MISSION (SMM)

GUEST INVESTIGATOR PROGRAM

	Page
Dear Colleague Letter	1-4
Enclosure 1 - Experiment Descriptions	1
Enclosure 2 - Experiment Status	1
Enclosure 3 - SMM Principal Investigators and Project Scientist	1
Enclosure 4 - Guidelines for Unsolicited Proposals for the Guest Investigator Program of the SMM	1-7

National Aeronautics and
Space Administration

Washington, D.C.
20546

Reply to Attn of

November 7, 1986

Dear Colleague:

This letter is to call your attention to a continuing opportunity for participation in the Solar Maximum Mission (SMM) as a Guest Investigator. The goal of the SMM Guest Investigator Program is to broaden the scientific participation in SMM and thereby enhance the scientific return from the mission.

Guest Investigators can participate in this program in one of several ways. They can use data from SMM observing sequences that are planned to be run. They can propose special operations for future data acquisition and interpretation from the SMM instruments that are operating. They can provide theoretical interpretative studies concerning the observations from SMM. Finally, data obtained by a Guest Investigator from another source may be combined with SMM data in a correlative investigation. In particular, the SMM Investigators Working Group has requested that proposals which provide theoretical interpretative studies be strongly encouraged.

The primary objective of SMM is to study solar flares and flare-related phenomena using an array of instruments carried on a free-flying satellite which was launched on February 14, 1980. A secondary objective is to measure the total radiative output of the Sun over an extended period with high accuracy and precision. The mission has returned data of excellent quality, covering nearly the entire electromagnetic spectrum, in a coordinated manner and has produced numerous, significant scientific results. Although spacecraft and instrument failures subsequently reduced the scientific capabilities of the mission in late 1980, the successful repair mission in April 1984 restored its performance to levels near those initially available with the exception of the Hard X-Ray Imaging Spectrometer (HXIS). Since that repair mission, the only significant failure is the grating drive of the Ultraviolet Spectrometer/Polarimeter (UVSP; see Enclosure 2).

A table summarizing the payload can be found in Enclosure 1. A much more complete description is given in a series of articles published in Solar Physics 65 (1980) pp. 5 ff. Enclosure 2 gives the current operational capability for each instrument. Specific questions about the detailed operation of individual experiments can be directed to the Principal Investigators (PI's) listed in Enclosure 3. Questions about the general capability and operation of the satellite can be directed to the SMM Project Scientist, also listed in Enclosure 3.

Unsolicited proposals for this continuing Guest Investigator (GI) Program may be submitted by anyone who is not formally included in the SMM experiment teams as a Principal Investigator (PI), Co-Investigator, or designated (i.e., funded) Experiment Team Scientist. Individuals who proposed for any of the first three rounds of the SMM GI Program (1977, 1984, 1985) may resubmit for this renewal of the Program. Prior selection or rejection during prior rounds will have no bearing on selections for this fourth phase of the GI Program. We emphasize that individuals selected during the 1985 round must resubmit for this new round if they desire further funding. Finally, it should be noted that this newest round of the SMM GI Program specifically excludes proposals that seek to use data that are only in the public domain; that is, data that are more than 1 year old. Proposals that do seek exclusive use of such archival data should be submitted in response to a Space Science and Applications Notice entitled "Space Astrophysics Data Analysis Program" that is being released nearly concurrent with this Notice.

For purposes of this SMM GI Program, qualifying individuals may propose:

1) To analyze observations taken with the SMM instruments using observing programs already run or planned independently by the SMM PI's (here it is understood that the Guest Investigator will establish an agreement of collaboration with the PI(s) whose data is(are) to be used; there is an emphasis on investigations involving acquisition of new data);

2) To analyze observations taken with the SMM instruments using observing programs planned by the Guest Investigator him/herself (here it is understood that the Guest Investigator will utilize existing SMM instruments on a cooperative basis with the PI(s));

3) To develop theoretical models that contribute to the planning and/or subsequent interpretation of specific SMM observations (proposals of this kind are particularly encouraged for this round of the SMM GI Program); and/or

4) To supply ancillary data from ground-based or other space experiments which augment specific, finite observing sequences planned for one or more of the SMM experiments and which will be used by the Guest Investigator to complete an investigation in conjunction with the SMM data.

Note: It is <u>not</u> anticipated that funds from the Program will be used to support routine (synoptic) ground- or space-based observations which are not directed to a specific, well-defined SMM observing sequence.

As deemed appropriate, selected Guest Investigators will be granted access to the data display and analysis facilities which have been established for the SMM at the NASA Goddard Space Flight Center in Greenbelt, Maryland. Therefore, expenditures for any additional data system hardware or for new software development must be clearly justified in the proposal, since the limited funds for this Program are primarily intended to support scientific analysis rather than hardware procurement or software development.

It is anticipated that NASA support will be limited to the provision of funding and/or SMM data for focused, clearly defined scientific investigations. Thus, proposals should be for specific research projects of limited scope. Selected proposals requiring financial support will nominally be funded for only 1 year or less. Therefore, commitments by NASA for financial support beyond 1 year will not be made at the time of selection.

It is to be emphasized that NASA's objective in this Program is to extend and augment, not to duplicate, the established SMM programs by broadening the participation of the scientific community in the planning of observation sequences and subsequent analyses of SMM data. Thus, potential proposers are encouraged (though not required) to discuss their research plans with the appropriate SMM PI(s) or with the SMM Project Scientist (all listed in Enclosure 3) prior to submitting a proposal.

Finally, while the major thrust of SMM has been to study flares and other energetic solar phenomena, any program of solar research that makes effective use of the SMM experiment capabilities is encouraged, especially since this coming year is the minimum phase of the current solar activity cycle. Therefore, nonsolar investigations are considered appropriate, such as aeronomy studies using solar extinction measurements during satellite sunrise/sunset periods. However, in any case offset pointing of the spacecraft from the Sun is not contemplated.

Approximately $500,000 is expected to be available for support of SMM Guest Investigator proposals in FY 1987. Therefore, it is expected that funds can be provided for the order of 20 proposals. (However, it must be emphasized that the final budget is not approved as of this date.) It will be helpful if unsolicited proposals are submitted in a format similar to that described in Enclosure 4, which also provides guidelines for the appropriate scope of such proposals, as well as submission procedures and mailing information. Proposals for funding of investigations will be reviewed on the schedule described in Section III of Enclosure 4.

Each proposal will be evaluated for scientific quality and relevance by members of the scientific community. It will also be reviewed by the appropriate SMM experiment teams to determine if the required data already exist or can be obtained by the SMM instruments in their current operational state. In addition, a proposal may be rejected if there is a severe conflict between the objectives of a potential Guest Investigator's program and those of a program already in progress by the SMM experiment teams. Therefore, early contact with the appropriate SMM PI(s) or with the SMM Project Scientist is particularly desirable before a proposal is submitted. Foreign and no-cost U.S. proposals will undergo the same scientific evaluation as those U.S. proposals which require financial support. It is anticipated that most of the selections for support of SMM Guest Investigators will be announced in early 1987.

Further questions regarding this SMM Guest Investigator Program may be directed to the SMM Program Scientist:

Dr. J. David Bohlin
SMM Program Scientist
Code EZ
National Aeronautics and Space Administration
Washington, DC 20546
(202)453-1466.

Sincerely,

B. I. Edelson
Associate Administrator for
Space Science and Applications

4 Enclosures

EXPERIMENT	PRINCIPAL INVESTIGATOR	PI INSTITUTION (MAIN CO-I INST.)	SPECTRAL RANGE	SPECTRAL RESOLUTION	SPATIAL RESOLUTION
GAMMA-RAY/NEUTRON SPECTROMETER (GRS)	E. L. CHUPP	U. NEW HAMPSHIRE (MAX-PLANCK-INST. AT GARCHING; NAVAL RESEARCH LAB.)	GAMMA-RAYS: 0.3-100 MeV NEUTRONS: $\geq$ 20 MeV	476 CHANNELS (7% AT 662 keV)	FULL SUN
HARD X-RAY BURST SPECTROMETER (HXRBS)	B. DENNIS	GODDARD SPACE FLIGHT CENTER	25-500 keV	15 CHANNELS (42% AT 122 keV)	FULL SUN
HARD X-RAY IMAGING SPECTROMETER (HXIS)	C. DE JAGER	ASTRON. INST. AT UTRECHT (U. OF BIRMINGHAM)	3.5-30 keV	6 CHANNELS (TYP. 16% AT 14 keV)	8"X8" OR 32"X32"
SOFT X-RAY POLYCHROMATOR (XRP)	K. T. STRONG J. L. CULHANE K.J.H. PHILLIPS	LOCKHEED PALO ALTO RES. LAB. MULLARD SPACE SCIENCE LAB. APPLETON LAB.	1.4-22.4 Å	TYPICAL 1 mÅ	TYP. 14"X14" FOR IMAGING; 6"X6" FOR SPECTRA
UV SPECTROMETER AND POLARIMETER (UVSP)	E. TANDBERG-HANSSEN	MARSHALL SPACE FLIGHT CENTER/ GODDARD SPACE FLIGHT CENTER	1100-3200 Å	0.03 Å	VARIABLE 1"X1" TO 15"X286"
CORONAGRAPH/ POLARIMETER (C/P)	R. M MacQUEEN	HIGH ALTITUDE OBSERVATORY	4465-6585 Å	4 BROAD BANDS; Fe XIV; H-ALPHA	10"X10"
SOLAR CONSTANT MONITORING PACKAGE (ACRIM)	R. C. WILLSON	JET PROPULSION LABORTORY	INTEGRATED SUNLIGHT	0.01% ACCURACY	FULL SUN

ENCLOSURE 1

EXPERIMENT	PRESENT STATUS	% FUNCTION
GAMMA-RAY/NEUTRON SPECTROMETER (GRS)	FULLY OPERATIONAL.	100%
HARD X-RAY BURST SPECTROMETER (HXRBS)	FULLY OPERATIONAL.	100%
HARD X-RAY IMAGING SPECTROMETER (HXIS)	NONFUNCTIONING.	0%
SOFT X-RAY POLYCHROMETER (XRP):		
FLAT CRYSTAL SPECTROMETER	6-12 MONTHS OF GAS AVAILABLE IN SYSTEM B (Ne IX). 12-18 MONTHS OF GAS REMAINS FOR SYSTEM A (O VIII AND Mg XI). 1 OR 2 REDUNDANT CRYSTAL DRIVES FAILED (Ca).	75%
BENT CRYSTAL SPECTROMETER	FULLY FUNCTIONAL EXCEPT FOR Fe XXVI CHANNEL	90%
UV SPECTROMETER AND POLARIMETER (UVSP)	WAVELENGTH DRIVE BROKEN; STILL ABLE TO DO UV CONTINUUM BURST OBSERVATION AND AERONOMY.	10%
CORONAGRAPH/ POLARIMETER (C/P)	FULLY OPERATIONAL.	100%
SOLAR CONSTANT MONITORING PACKAGE (ACRIM)	FULLY OPERATIONAL.	100%

ENCLOSURE 2

SMM PRINCIPAL INVESTIGATORS AND PROJECT SCIENTIST

XRP

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National Aeronautics and Space Administration
Greenbelt, MD 20771
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HXIS

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UVSP

Dr. Einar Tandberg-Hanssen
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National Aeronautics and Space Administration
Huntsville, AL 35812
205-453-0027
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ACRIM

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ENCLOSURE 3

GUIDELINES FOR UNSOLICITED PROPOSALS FOR THE GUEST INVESTIGATOR PROGRAM OF THE SOLAR MAXIMUM MISSION

I. PURPOSE

These guidelines provide suggestions for the appropriate scope and format of unsolicited proposals for participation as a Guest Investigator in NASA's Solar Maximum Mission (SMM). Submission procedures and mailing information are also given.

II. GUIDELINES FOR PARTICIPATION

The purpose of this Guest Investigator Program is to obtain the widest possible scientific participation on SMM and thereby to extend and augment the scientific return of the mission beyond that which could be provided by the original investigations alone. Examples of possible modes of participation are:

1. To provide expertise in reduction and/or analysis of data from an existing or previously planned SMM observing program;

2. To analyze data from an SMM observing program originated by the Guest Investigator;

3. To provide theoretical models which directly aid in the planning for and/or analysis of data from the SMM experiments (theoretical proposals are particularly encouraged for this round of this Guest Investigator Program); and/or

4. To supply and analyze ground-based or space experiment data which complement and extend specific research programs to be done with SMM data.

The primary objectives of the individual SMM experiments are given in the journal Solar Physics 65 (1980), pp. 5 ff. These objectives are achieved by the SMM through coordinated operation of the individual experiments in a series of observing sequences, each of which is devoted toward a well-defined scientific goal.

ENCLOSURE 4

These operational programs are established by an Investigators Working Group (IWG) composed of the Principal Investigators (PI's) of the SMM. The IWG will continue to function throughout the mission to further refine these coordinated programs and define scientific objectives.

Some guidelines for participation in the SMM Guest Investigator Program are the following:

o Although it is not mandatory that a proposer contact the PI whose SMM experiment and data would be used, it is clearly in the interest of the proposer to ensure that his intended research does not duplicate a program already planned or in progress by the IWG.

o All SMM data, whether generated for a Guest Investigator program or not, will become public domain 1 year after delivery of the final data tapes to the PI's.

o Proposals that seek to analyze SMM data that are entirely in the public domain, i.e., that are over 1 year old, are excluded from this Program. Instead, those proposals should be submitted in response to a separate Space Science and Applications Notice, entitled "Space Astrophysics Data Analysis Program," being issued nearly concurrent with this Notice.

o Since funds for this Guest Investigator program are limited, extensive hardware or software development programs are not encouraged. Preference will be shown to those proposals that make use of existing facilities from which collaborative data can be obtained and especially those that directly utilize data from the SMM itself.

o Proposals for theoretical studies should emphasize direct, quantitative testing of predictions by SMM observations and/or detailed interpretation of specific SMM results. General theoretical models or derivation of ancillary parameters (e.g., atomic constants) are not encouraged.

o Upon occasion, approved Guest Investigators may be requested to take part in meetings of the SMM Investigators Working Group (IWG). Generally, this participation will be requested of those Guest Investigators who expect to make active use of the SMM experiments for special observing programs. Guest Investigators who propose detailed ground-based collaborations requiring temporally and spatially correlated SMM observations may also be invited to participate in the IWG.

o Approved Guest Investigators who have special observing requirements for the SMM experiments may be allowed to utilize the GSFC Experimenters Operations Facility (EOF) for the period necessary to plan and execute their particular programs. (NASA has established an EOF conducive to near real-time planning and evaluation of SMM data by the collective experiment teams.)

o It is expected that the Guest Investigators will publish their findings in a timely fashion after receipt of the SMM data. It is customary that publications using SMM data will be co-authored with the relevant SMM experiment PI or his designated Co-Investigators. Copies of all publications are to be submitted to both the SMM Project and Program Scientists (listed elsewhere in this letter). In any event, a progress report should be submitted to the SMM Program Scientist approximately one year after initiation of the Guest Investigation.

III. SCHEDULE

NASA plans to begin implementation of this fourth phase of the SMM Guest Investigator Program in early 1987. Proposals will be reviewed and selected according to the following schedule:

- o Proposals received by mid-February 1987
- o Will be reviewed by mid-March 1987
- o With selections made by the end of April 1987.

IV. PROPOSAL CONTENT AND FORMAT

The content of the proposal should be in sufficient detail to enable a reviewer to make a judgment with respect to: (1) the relevance of the proposed research to the Solar Maximum Mission; (2) the probability that the investigators will be able to accomplish the stated objectives within the requested time and resources; and (3) its overall value as compared to that of other proposals received for this program.

It will be helpful if each proposal is limited to the equivalent of ten single-spaced, typewritten pages (any other pertinent information, such as publications, data, etc., may be included as enclosures) and contain at least the following material assembled in the order given:

A. Cover letter. Each proposal should be prefaced by a cover letter signed by an official of the investigator's organization who is authorized to commit the organization to the proposal and its contents. The cover letter should refer to the SMM Guest Investigator Program.

B. Title page. The title page should contain the following:

1. A short descriptive title for the proposed unsolicited investigation.

2. Name of the proposing organization(s).

3. Names, full addresses, telephone numbers, and affiliations of the principal Guest Investigator and any Co-investigators.

4. Date of submission.

5. Total cost.

6. List of relevant SMM instruments whose data will be used by the investigation.

C. Abstract page. This should contain a concise summary of the objective of the proposed research and method of approach.

D. Description of proposed research. A brief introduction, background, and justification should be included. The description should be a full statement of the research proposed, identifying and relating the key elements to the SMM, and identifying the importance of anticipated results. Describe the methods or approaches to be used; as appropriate, discuss the advantages of the proposed approach over alternatives.

E. Data required. Specify as completely as possible the nature and amount of data required and the method of acquisition and, if special spacecraft operations are required, under what conditions the data are to be obtained.

F. Cost plan (applicable to U.S. proposals only). Selected proposals can be supported for nominally 1 year or less; commitments by NASA for SMM guest investigator support beyond 1 year cannot be made. The cost plan may be prepared according to the guidelines of the institution submitting the proposal and should include the following:

1. Cost estimates for direct labor, including individual man-months and rates for the personnel involved.

2. Estimated costs for materials and computer services. Itemize items over $500.

3. Travel costs: Itemize all expected travel; if appropriate, cost out participation in one meeting of the IWG at GSFC, and 1 week's residence in the vicinity of GSFC during the mission to participate in mission operations, as may be requested by the IWG.

4. Overhead rates and costs.

5. Other costs, with explanation. Itemize items over $1000.

6. Contribution from any cost-sharing plan.

7. Total cost of support being requested from NASA.

G. Enclosures - Include appropriate descriptions of available facilities, bibliographies, and such other materials (as relevant only).

V. GENERAL POLICY

The Federal Acquisition Regulations, 15.506-1(a), specify that the initial receiving office, prior to making a comprehensive evaluation of a document apparently submitted as an unsolicited proposal, shall determine that the document:

1. Contains sufficient scientific, technical, and cost information to enable meaningful evaluation;

2. Has been approved by a responsible official of the originating or sponsoring organization, or a person authorized to contractually obligate such an organization.

If the document does not meet these requirements, a comprehensive evaluation will not be made, and the document will be considered and handled as correspondence.

VI. PROPOSAL SUBMISSION INFORMATION

Fifteen copies of the proposal should be submitted. One copy should be clear, black on white paper, of a quality suitable for reproduction. Proposals for participation by individuals outside of the United States should be submitted in the same format (excluding cost plans) as U.S. proposals and must be typewritten in English. Proposals in response to this Notice originating in the United States should be sent to:

Dr. J. David Bohlin
SMM Program Scientist
Code EZ
National Aeronautics and Space Administration
Washington, DC 20546

Foreign proposals should be sent to:

International Affairs Division
Code LID (SMM)
National Aeronautics and Space Administration
Washington, DC 20546
USA

Foreign proposers must have their proposals reviewed and endorsed by their appropriate foreign government agency before submission to NASA. Foreign proposals received by the NASA International Affairs Division will go through the same evaluation and selection process as U.S.-originated proposals. In the case where a foreign proposal is selected, NASA will arrange with the sponsoring foreign agency for the proposed participation on a cooperative (no exchange of funds) basis, in which NASA and the sponsoring agency will each bear the cost of discharging their respective responsibilities.

VII. PROPOSAL REVIEW AND PROGRAM IMPLEMENTATION

Unsolicited proposals that meet the requirements noted in Section V above will be submitted for review to three or more peers of the proposer in the scientific community. In addition, the SMM Principal Investigators will participate in the review of unsolicited proposals relating to their particular experiments. Final acceptance of unsolicited proposals for support will be made by the Solar and Heliospheric Physics Office, under the general cognizance of the SMM Program Scientist, and will take into consideration the comments by the reviewers, the general adherence to the guidelines for this program, the distribution of funds among the various research topics, and the availability of financial resources.

The SMM Guest Investigator Program will be implemented and managed at NASA Headquarters by the Solar and Heliospheric Physics Office, although actual processing of the grants or contracts will be handled through the NASA Goddard Space Flight Center.

VIII. DISCLOSURE OF PROPOSAL DATA

A. Commercial and Financial Data

1. It is NASA's policy to use commercial and financial data included in unsolicited proposals for evaluation purposes only. This policy applies even if the commercial and financial data in the proposal do not bear any specific notice.

2. Where it is the practice of an offeror or his proposed subcontractor to treat certain

commercial and financial data as a trade secret, and such data are protectible as a trade secret under law, he may apply the "Notice" of paragraph B below to those portions to be maintained as a trade secret.

3. In any event, commercial and financial data submitted to NASA in an unsolicited proposal will be protected to the extent permitted under the law, either as a properly noticed trade secret, or as commercial or financial information received from a person as confidential or priviledged.

B. Technical Data

It is NASA's policy to use the technical data contained in proposals for evaluation purposes only. Where any technical data constitute a trade secret under the law and the offeror, or his proposed subcontractor, desires to maintain trade secret rights in such technical data, the following "Notice" must be affixed to the cover sheet of the proposal specifying therein the pages of the proposal which contain trade secrets to be restricted in accordance with the conditions of the "Notice." Thereafter, it is NASA policy to protect such noticed technical data as a trade secret. NASA assumes no liability for use or disclosure of any technical data to which the "Notice" has not been applied.

NOTICE

Data on page(s) ____ of this proposal constitute a trade secret. They are furnished to the Government in confidence with the understanding that they will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided however, in the event a contract is awarded on this proposal, the Government may obtain in the contract additional rights to use and disclose these data.

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National Aeronautics and
Space Administration

Washington, D.C.
20546

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Space Science & Applications Notice

SPACE ASTROPHYSICS DATA ANALYSIS PROGRAM

NAS 1.53/2:

Space Science & Applications Notice

TABLE OF CONTENTS

FOR THE

SPACE ASTROPHYSICS DATA ANALYSIS PROGRAM

		PAGE
Dear Colleague Letter		1-4
Enclosure 1 -	Guidelines for Unsolicited Proposals for Space Astrophysics Data Analysis Program.	1-9
Enclosure 2 -	Available Infrared Astronomy Satellite Data and Capabilities of the Infrared Processing and Analysis Center	1-2
Enclosure 3 -	The International Ultraviolet Explorer Public Domain Data Archives.	1-3
Enclosure 4 -	High Energy Astronomy Observatory 1 Data Archives	1-11
Enclosure 5 -	High Energy Astronomy Observatory 2 Data Archives	1-4
Enclosure 6 -	High Energy Astronomy Observatory 3 Data Archives	1-7
Enclosure 7 -	European X-ray Observatory Satellite Data Archive	1-2
Enclosure 8 -	Solar Maximum Mission Data Archives	1-3
Enclosure 9 -	National Space Science Data Center.	1-5
Enclosure 10 -	Relevant Research Areas	1

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National Aeronautics and
Space Administration

Washington, D.C.
20546

Reply to Attn of: EZ (EJW)

Dear Colleague:

This letter calls your attention to a continuing opportunity to participate in the National Aeronautics and Space Administration (NASA) Space Astrophysics Data Analysis Program (SADAP) for the analysis of public domain data from previous and current astrophysics space missions. Public domain data are data that are available for analysis by the broad scientific community. No individual or group possesses proprietary rights to such data.

The purpose of the SADAP is to optimize the scientific return from individual astrophysics space missions and to enable broad scientific investigations that may require the analysis of data from several astrophysics missions' data sets. The SADAP is intended to merge all previously separate astrophysics missions' public domain data analysis programs into a unified program. Thus, this Notice replaces the separate notices that were previously distributed for public domain astrophysics space data analysis on the following astrophysics missions: the High Energy Astronomy Observatories (HEAO); the European X-ray Observatory Satellite (EXOSAT); the Infrared Astronomical Satellite (IRAS); the International Ultraviolet Explorer (IUE); and the Solar Maximum Mission (SMM). Two classes of scientific investigations will be considered under the SADAP: 1) investigations that require public domain data from a single mission or experiment; and 2) investigations that require public domain data from several missions or experiments. The degree of interest in this second class of investigations, as evidenced by the response to this Notice, will assist NASA in formulating future plans for multidisciplinary data centers and archival research programs. It is presently expected that this program will be funded at a level of about 3 million dollars per year.

SCOPE

The following public domain data sets are available for scientific analysis under the SADAP:

1. HEAO-1 (all experiments);
2. HEAO-2 (all experiments);
3. HEAO-3 (C1 and C3 experiments);
4. EXOSAT;
5. IRAS;
6. IUE; and
7. SMM (all experiments).

A summary of each individual public domain data set is provided in Enclosures 2 through 8. Each summary provides information on the actual content of the data set, nature of the data (e.g., complexity, etc.), available data reduction and analysis facilities, additional information or documentation available, and a point of contact who will supply further information upon request from prospective scientific investigators.

This Notice is for the scientific analysis of the public domain data listed above. Under this Notice, NASA will consider proposals involving research on significant problems in astrophysics which utilize these data sets. The proposed research may involve the theoretical interpretation of the data (including analytic or computer modeling) and/or correlative data analyses, such as using existing data found on objects or regions at wavelengths other than those measured with the missions/experiments included in the SADAP.

Under this Notice, the SADAP will not consider proposals to obtain new observations using telescopes/experiments based on the ground, airplanes, balloons, rockets, or other spacecraft. In addition, proposals for laboratory investigations which would support the analysis of SADAP data sets will not be considered.

The SADAP is not intended to replace the ongoing research and analysis efforts of the original Principal Investigator (PI) teams for any of the following missions: HEAO-1, HEAO-2, HEAO-3, IRAS, and SMM. Such efforts will continue to be funded, as appropriate, as determined by the cognizant Astrophysics Division Program Office at NASA Headquarters. Members of the original PI teams are permitted to participate in the SADAP, however, in the following manner: Team members may propose scientific investigations that utilize data from their own experiment to the extent that such data are equally available to any outside investigator; or, they may propose scientific investigations that utilize other data sets available through the SADAP.

DURATION OF PROGRAM

The Space Astrophysics Data Analysis Program is a continuing program. Current plans call for a new issuance of this Notice each year.

PROPOSALS

This Notice is for United States (U.S.) scientists requiring funds from NASA for analysis of data available through the SADAP and for U.S. and foreign scientists wishing to make use of the various SADAP data processing and analysis facilities described in Enclosures 2 through 8. It is expected that the modes of participation by U.S. investigators will include five types. The first mode, henceforth Type 1, will be programs where financial support will not exceed about $5,000 per year for each proposal. These proposals will usually include items such as travel support to an analysis facility and some funding for resultant publications. The details of funding Type 1 selected proposals will be handled at the discretion of the funding center (funding centers are described in Enclosure 1, Section IV). The duration of Type 1 proposals will be for a period of 1 year, although a renewal for up to 1 additional year will be considered on a case-by-case basis.

The second mode of participation, henceforth Type 2, will involve programs where the financial support will not exceed about $30,000 for each proposal per year. These proposals will usually include such items as graduate student or postdoctoral support, summer salary, computer time at the home institution, travel, publication costs, etc. The duration of Type 2 proposals may be up to 3 years, and short renewal proposals will be required each year.

In the third mode of participation, henceforth Type 3, a very limited number of proposals will be approved in which the investigator indicates that a major fraction of his/her scientific research will be focused on SADAP data analysis. For these proposals, the financial support is not expected to exceed about $100,000 per year for up to 3 years. An indepth renewal proposal will be required each year.

The fourth mode of participation, henceforth Type 4, will involve programs that are directly related to future observational research with the Hubble Space Telescope (HST). Proposed SADAP investigations submitted under this category must be aimed at research that will more clearly define future HST observations or make HST observing programs more efficient. It is anticipated that about ten Type 4 investigations will be selected. These successful investigations will be funded for 1 year only, and they will be limited to no more than $50,000 per investigation.

The fifth mode of participation, which requires no direct funding, henceforth Type 5, pertains to those U.S. scientists who wish to make use of any of the data reduction and analysis facilities described in Enclosures 2 through 8 and who do not require funding from NASA. This type also includes foreign scientists wishing to participate in the SADAP. Successful proposers under this mode of participation would be entitled to priority use of a particular facility or facilities over those scientists who might simply visit a facility as an informal "walk-in." See Enclosure 1 (Modes of Participation) for more details on all five proposal types.

Some SADAP data products are also available upon request from the National Space Science Data Center without responding to this letter. These products are listed and described in Enclosure 9. The use of the various data reduction and analysis centers described in Enclosures 2 through 9 is also possible on a noninterference basis without responding to this letter. See Enclosure 1 (Modes of Participation) for details.

Although unsolicited SADAP proposals may be submitted at any time, reviews will be conducted only once each year. The first review is planned for the spring of 1987, and proposals received by the middle of February 1987, will be included in that review. In general, proposals received after this date will be held until the subsequent review approximately 1 year later. To facilitate planning for the peer review process, individuals who intend to submit SADAP proposals should submit "Letter of Intent" by the middle of December 1987. See Enclosure 1 (Letter of Intent) for more details.

Suggested guidelines for the preparation and submission of proposals are contained in Enclosure 1. Use of these guidelines will simplify the preparation and review of proposals. Enclosures 2 through 8 provide descriptions of the relevant mission data bases, provided by the technical contacts for each mission.

PROGRAM MANAGEMENT

NASA's Space Astrophysics Data Analysis Program is managed by the Astrophysics Division, Code EZ, NASA Headquarters, Washington, DC 20546. Dr. Edward J. Weiler, Chief, Astronomy/Relativity Branch (202-453-1469), is the designated Program Manager.

Questions regarding proposal format, evaluation procedures, or requests for further general information should be referred to Dr. Weiler. Specific questions regarding the technical details of the various public domain data sets should be addressed to the appropriate points of contact listed in Enclosures 2 through 9.

Sincerely,

B. I. Edelson
Associate Administrator for
Space Science and Applications

10 Enclosures

GUIDELINES FOR PARTICIPATION IN THE SPACE ASTROPHYSICS DATA ANALYSIS PROGRAM

I. PURPOSE

This section provides procedural and format information for submission of unsolicited proposals for funding within the Space Astrophysics Data Analysis Program (SADAP).

II. MODES OF PARTICIPATION

NASA will entertain proposals involving research on significant problems requiring the use of the public domain data available under the SADAP. The proposed research may involve theoretical interpretation of the data (including analytic or computer modeling) and/or correlative data analyses, such as using existing data found on objects or regions at wavelengths other than those measured with the various missions/experiments included in the SADAP. Under this Notice, the SADAP will not entertain proposals to analyze new observations using telescope/experiments based on the ground, airplanes, balloons, rockets, or other spacecraft. In addition, proposals for laboratory investigations which support the analysis of SADAP data sets will not be considered.

There are five modes of potential participation in the SADAP. They are:

Type 1. Scientific investigations that only request travel and publication support from SADAP. Such investigations will be considered for a 1-year funding level of no more than about $5,000. One-year extensions of such investigations will be considered on a case-by-case basis.

Type 2. Scientific investigations that require funding beyond travel and publication costs (e.g., graduate student or postdoctoral support, computer time, summer salary, etc.). Such proposals may indicate a funding request up to about $30,000 per year for up to 3 years. Only a simple renewal proposal will be required for second or third year funding which demonstrates adequate progress toward proposed research goals. Type 2 proposals will also be considered for participation in Type 1 and Type 5, if judged appropriate by the peer review process.

Type 3. Scientific investigations in which the investigator proposes to devote a major portion of his/her scientific research effort to the analysis of SADAP data. It is expected that these proposals will describe the research approach in much more detail than either Type 1 or 2 proposals (see Section III.V. for more details). If, in the process of completing these scientific programs, it is anticipated that analytic tools (e.g., software, image processing techniques, etc.) will be developed which would be of use to the general SADAP data user community, such tools should be explained. Awards in this category are not expected to exceed about $100,000 per year nor be of a duration that would exceed 3 years. A renewal proposal would be required for a second or third year of funding which would describe in detail the progress made and research plan for the upcoming period. It is anticipated

that the total funding of proposals in this category would not exceed more than 20 percent of the total available funding for the SADAP per year, so the number of awards will be quite limited. Proposals submitted under this category will be considered only for Type 3 participation.

Type 4. Scientific investigations which are directly related to future observational research with the Hubble Space Telescope (HST). Proposed SADAP investigations submitted under this category must be aimed at research that will more clearly define future HST observations or make HST observing programs more efficient. It is anticipated that about ten Type 4 investigations will be selected. These successful investigations will be funded for 1 year only, and they will be limited to no more than $50,000 per investigation. Type 4 proposals will also be considered for participation in Types 1, 2, or 5, if judged appropriate by the peer review process.

Type 5. Scientific investigations that require data reduction and analysis support from a particular SADAP facility, but which require no direct funding from NASA. Foreign investigations would also be included in this category. Selected investigations would be given priority on the use of appropriate SADAP data reduction and analysis facilities over scientists who may wish to use the facility but who have not submitted a successful proposal to the SADAP.

This Notice is intended for U.S. scientists requiring funds from NASA for analysis of public domain astrophysics data available under the SADAP and/or for U.S. and foreign scientists wishing to make extensive use of the various data reduction and analysis facilities described in Enclosures 2 through 8.

Some SADAP data products are also available upon request from the National Space Science Data Center (NSSDC) at the NASA Goddard Space Flight Center (GSFC) for the cost of reproduction. These SADAP products are detailed in Enclosure 9, which also describes other relevant astronomical data sets in NSSDC not part of this program.

Individuals who only need access to products that are listed in Enclosures 2 through 9 may have access to the relevant SADAP data reduction and analysis facilities, on a noninterference basis, without responding to this Notice. For detailed information on the data or facilities available, please contact the appropriate SADAP data reduction and analysis facility representative listed in Enclosures 2 through 9.

III. SCHEDULE

Proposals for participation in the SADAP will be reviewed on an annual basis. Proposals received before the middle of February 1987, will be evaluated at the first review in the spring of 1987. In general, proposals received after this date will be held until a subsequent review, approximately 1 year later. Notification of the review results is planned for late spring 1987. The schedule of planned activities for the SADAP is shown below:

Issuance of Notice	November 1986
Letters of Intent due	Mid-December 1986
Cutoff date for receipt of proposals	Mid-February 1987
Peer reviews	March 1987
Proposal selections	May 1987

While the above discussion presents NASA's intent, it should be realized that future circumstances and events could cause deviations from this planned schedule.

IV. PROPOSAL REVIEW AND PROGRAM IMPLEMENTATION

Proposals will be evaluated for their scientific merit and technical feasibility by a scientific peer panel and the relevant proposal reception and review centers (see Section VI). Proposals requiring data from several public domain data sets will be reviewed by multiple panels as appropriate. For example, an investigation that requires IUE and HEAO-2 data will be reviewed by both the High Energy Astrophysics and the Ultraviolet Astronomy panels. To ensure a thorough understanding of the multidisciplinary value of such an investigation, the Ultraviolet Astronomy Panel would include a few scientists familiar with the scientific and technical aspects of the HEAO-2 data, and the High Energy Panel would include a few scientists who understand the IUE data set. At this time, it is anticipated that there will be four basic peer review panels. These four panels will have the following proposal review responsibility: 1) High Energy Astrophysics Panel - the HEAO and EXOSAT data sets; 2) Ultraviolet Astronomy Panel - the IUE data set; 3) Infrared Astronomy Panel - the IRAS data set; and, 4) the Solar Astronomy Panel - the SMM data set. Upon completion of the individual panel reviews, a final, multidisciplinary peer review will take place. The purpose of this review will be to develop a recommendation on a total program selection based on the results of the individual panel's recommendations, on the scientific objectives of the proposal in terms of program content, and on the amount of available funds. This final panel will also resolve any discrepancies between the individual panels concerning multidisciplinary investigations. Proposals selected for support will be forwarded to the appropriate NASA field center or the Jet Propulsion Laboratory for the issuance of grants. The NASA Goddard Space Flight Center will issue grants for those selected investigations that emphasize the use of either IUE or SMM data; the Jet Propulsion Laboratory will issue grants for selected investigations that emphasize the use of IRAS data; and the NASA Marshall Space Flight Center will issue grants for selected investigations that emphasize the use of HEAO or EXOSAT data.

V. PROPOSAL CONTENT AND FORMAT

The content of the proposal should be in sufficient detail so that a reviewer can make a judgment with respect to: 1) the overall scientific merit of the proposed research; 2) the technical feasibility of accomplishing the stated scientific goals (e.g., the suitability of the requested data for the subject investigation; 3) the relevance of the research to the SADAP; 4) the need for multimission/experiment data to solve a proposed scientific problem, if appropriate; and, 5) the probability that the proposer will be able to accomplish the stated objectives within the requested resources.

All pages should be numbered consecutively. Each type of proposal should be typewritten and single-spaced. The page limits for the body (defined by items V.B. and V.C. below) of the various types of proposals is listed below (the page limit includes figures and tables):

Type 1 proposals - 5 pages;
Type 2 proposals - 10 pages;
Type 3 proposals - 20 pages;
Type 4 proposals - 15 pages; and
Type 5 proposals - 5 pages.

Any other pertinent information, such as publications, etc., may be included as appendices. The proposal should contain at least the following material in the order given:

A. Title Page: The title page should contain the following:

(1) A short, descriptive title for the proposed investigation referring to the SADAP;

(2) The words "Type 1 SADAP Proposal" or "Type 2 SADAP Proposal" or etc. should be clearly marked at the top of the title page;

(3) Name of the proposing organization(s);

(4) Name, full address, telephone number, and affiliation(s) (if any);

(5) Date of submission;

(6) Mission/experiment data sets to be utilized in the proposed research (should correspond to the proposal reception and review center to which the proposal is sent) and the relevant research area (see Enclosure 10); and

(7) Signatures - each proposal must be signed by an official of the investigator's organization who is authorized to commit the organization to the proposal and its contents.

B. Description of the Proposed Research: An abstract in 100 words or less should precede the main body of the proposal. The main body of the proposal should include a brief introduction, background, and justification.

Selected Types 1, 4, and 5 proposals will be supported for 1 year only (extensions of up to 1 year may be granted for Type 1 investigations). For Type 2 and 3 proposals that require more than 1 year of support, a full description of the entire effort should be included.

C. Description of Analysis Plans: The proposer should include in his/her proposal a sufficiently detailed description so that project/experiment personnel can judge the level to which the processing/analysis capabilities of the relevant SADAP center (described in Enclosures 2 through 8) will be required. This plan should include a description of any unique requirements for the research, such as new data reduction programs, extensive SADAP center computer support, etc.

D. Previous Research Funded Under the Individual SADAP Mission/Experiment Guest Investigator Programs: This information should be divided into two parts and should be included as an appendix to the proposal. Part 1 is a summary of previously approved research programs involving (in any investigative capacity) the Principal Investigator and/or any of the Co-Investigators. This information is requested only for funded research within the individual guest investigator and data analysis programs on the HEAO missions, EXOSAT, IUE, IRAS, and the SMM. The information should be listed according to the format prescribed below.

APPROVED GUEST INVESTIGATOR PROGRAMS

Short Title and Investigators	Year
1.	
2.	
3.	

The list of previous and/or current programs should be limited to one page. Lists which would otherwise be longer may, for example, specifically identify those programs most closely related to the present proposal.

Part 2 of this section is a further summary of previous or ongoing guest investigator research programs. Part 2 should contain a bibliography of publications resulting from the previously approved programs listed in Part 1. It should also contain a very brief status report on programs still in progress. A sample format for Part 2 data is given below:

GUEST INVESTIGATOR PROGRAM PUBLICATIONS

(Title, Authors, Reference)

1.
2.
3.

STATUS OF GUEST INVESTIGATOR PROGRAMS IN PROGRESS
(100 words or less for each major area of research)

Part 2 should be limited to two pages. Longer bibliographies might specifically address guest investigator research in progress and only those published works most closely related to the current proposal.

E. Cost Plan: Prepared according to the guidelines of the institution submitting the proposal and including (required for U.S. institutions only):

1. Cost estimates for direct labor, including individual man-months and rates for the personnel provided;

2. Estimated costs for computer services, including type of computer and number of hours, equipment, and materials at some institutions. Itemize items over $500;

3. Travel costs - itemize trips, including travel to data analysis centers (Note: In general, only one trip to one professional society meeting will be supported in each successful proposal per year.);

4. Overhead rates and costs;

5. Other costs, with explanation;

6. Contribution from any cost-sharing plan; and

7. Total cost of support being requested from NASA. The total amount should be limited to approximately:

(a)	Type 1 proposals	$5,000
(b)	Type 2 proposals	$30,000 per year
(c)	Type 3 proposals	$100,000 per year
(d)	Type 4 proposals	$50,000 per year

F. Appendices: Appropriate descriptions of available facilities, bibliographies, and other materials desired (see also Item V.D.).

G. General Policy: The Federal Acquisition Regulations, 15.506-1(a), specify that the initial receiving office, prior to making a comprehensive evaluation of a document apparently submitted as an unsolicited proposal, shall determine that the document:

(1) Contains sufficient scientific, technical, and cost information to enable a meaningful evaluation;

(2) Has been approved by a responsible official of the originating or sponsoring institution, or a person authorized to contractually obligate such an organization; and

(3) Complies with the marking requirements of 15.509.

If the document does not meet these requirements, a comprehensive evaluation will not be made, and the document will be considered and handled as correspondence.

VI. PROPOSAL SUBMISSION INFORMATION

Twenty copies of the proposal should be submitted to each appropriate proposal reception and review center. The centers are listed below, including the specific missions/experiments within their purview. If the proposed investigation requires data from missions/experiments that are the responsibility of different proposal reception and review centers, twenty copies must be sent to each appropriate center. Proposals from individuals outside the United States must be submitted in the same format (excluding cost plans) as U.S. proposals. They should be typewritten in English.

Proposal Reception and Review Centers:

1. High Energy Astrophysics - HEAO-1, HEAO-2, HEAO-3, and EXOSAT Public Domain Data

   High Energy Program (SADAP)
   Attn: Dr. Frederick D. Seward
   Smithsonian Astrophysical Observatory
   60 Garden Street
   Cambridge, MA 02138
   USA

2. Infrared Astronomy - IRAS Public Domain Data

   IRAS Program (SADAP)
   Attn: R. Hernandez
   Mail Code 100-22 (IRAS)
   Jet Propulsion Laboratory
   4800 Oak Grove Drive
   Pasadena, CA 91109
   USA

3. Ultraviolet Astronomy - IUE Public Domain Data

   IUE Program (SADAP)
   Attn: Dr. Donald West
   Code 684
   Goddard Space Flight Center
   National Aeronautics and Space Administration
   Greenbelt, MD 20771
   USA

4. Solar Astronomy - SMM Public Domain Data

SMM Program (SADAP)
Attn: Dr. J. David Bohlin
Code EZ
National Aeronautics and Space Administration
Washington, DC 20546
USA

In addition, for proposals originating outside the United States, one copy should be sent to:

International Affairs Division (SADAP)
Code LID
National Aeronautics and Space Administration
Washington, DC 20546
USA

Foreign proposers must have their proposals reviewed and endorsed by the appropriate foreign government agency. Foreign proposals will go through the same evaluation and selection process as the U.S. proposals. In the case where a foreign proposal is selected, NASA will arrange with the sponsoring foreign agency for the proposed investigation on a cooperative (no exchange of funds) basis, in which NASA and the sponsoring agency will each bear the costs of discharging its respective responsibility, including travel and subsistence for its own personnel.

To assist in the overall management of the program, each proposer should send a copy of the proposal's cover page and abstract to the Program Manager at NASA Headquarters:

SADAP
Attn: Dr. Edward J. Weiler
Code EZ
National Aeronautics and Space Administration
Washington, DC 20546
USA

VII. DISCLOSURE OF PROPOSAL DATA

A. Commercial and Financial Data

(1) It is NASA's policy to use commercial and financial data included in unsolicited proposals for evalution purposes only. This policy does not require that this kind of proposal data bear a notice.

(2) Where it is the practice of an offeror or his/her proposed subcontractor to treat certain commercial and financial data as a trade secret under the law, he/she may apply the "Notice" of paragraph B below to those portions to be maintained as a trade secret; and

(3) In any event, commercial and financial data submitted to NASA in an unsolicited proposal will be protected to the extent permitted under the law, either as a properly noticed trade secret, or as commercial or financial information received from a person as confidential or privileged.

B. Technical Data: It is NASA's policy to use the technical data contained in proposals for evaluation purposes only. Where any of such technical data constitutes a trade secret under the law and the offeror, or his/her proposed subcontractor, desires to maintain secret rights in such technical data, the following "Notice" must be affixed to the cover sheet of the proposal, specifying, therein, the pages of the proposal which contain trade secrets to be restricted in accordance with the conditions of the "Notice." Thereafter, it is NASA policy to protect such noticed technical data as a trade secret. NASA assumes no liability for use or disclosure of any technical data to which the "Notice" has not been applied.

NOTICE

Data on page(s)_____of this proposal constitutes a trade secret. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, in the event a contract is awarded on this proposal, the Government may obtain in the contract additional rights to use and disclose this data.

VIII. LETTER OF INTENT

To facilitate planning for proposal evaluation and the timely selection of scientific peer review panels, it will be useful if investigators intending to submit unsolicited proposals for this program will notify NASA by the middle of December 1986. A one-page letter of intent containing the name and affiliation of the Principal Investigator and all Co-Investigators, plus a short description of the proposed research and the relevant public domain data sets involved, should be sent to SADAP, Attn: Dr. Edward J. Weiler, Code EZ, NASA Headquarters, Washington, DC 20546, USA.

AVAILABLE IRAS DATA AND CAPABILITIES OF THE INFRARED PROCESSING AND ANALYSIS CENTER (IPAC)

The IRAS mission performed an all-sky survey that covered over 95 percent of the sky to a flux density of ~0.4,0.5,0.6 and 1.0 Jy at 12um, 25um, 60um and 100um. In addition, pointed observations covered several thousand square degrees to a sensitivity ~5-10 times deeper than in the all-sky survey. The IRAS mission was described by Neugebauer, et al. (Ap. J. Letters, 278, L1), while the IRAS instrument and data as described in detail in the IRAS Explanatory Supplement (1985, U.S. Government Printing Office). The IRAS Explanatory Supplement is available from:

Dr. Wayne Warren
Code 633
National Space Science Data Center
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, MD 20771

More detailed descriptions of the IRAS data products and the capabilities of IPAC are available by contacting:

Mr. B. T. Soifer
IPAC Chief Scientist
Department 100-22
California Institute of Technology
Pasadena, CA 91125
Phone: (818) 584-2905

The IRAS data products listed below are available for the cost of reproduction upon request from the National Space Science Data Center (NSSDC):

Explanatory Supplement (printed)
Point Source Catalog (microfiche, magnetic tape)
Point Source Catalog Working Survey Data Base (magnetic tape)
Cataloged Galaxies and Quasars Observed in the IRAS Survey (printed)
Small Scale Structures Catalog (microfiche, magnetic tape)
All-Sky Surface Brightness Images (2' pixels, each of 3 HCON's separately, 4x5 inch transparencies, FITS format images on magnetic tape)
Galactic Plane Surface Brightness Images (2' pixels, galactic latitude ¶b¶<10 degrees, 3 separate HCON's, magnetic tape)
Low Resolution All-Sky Maps (0.5 degree pixels, separate HCON's, 4x5 inch transparencies, FITS format images on magnetic tapes)
Zodiacal History File (0.5 degree pixels, time ordered all-sky coverage, magnetic tape)
Nonsurvey (pointed) observations (FITS format images, magnetic tape)

Serendipitous Survey Catalog (printed, magnetic tape, due to be released summer/fall 1986)
Point Source Reject File (magnetic tape, due to be released fall 1986)
Known Asteroids and Comets Catalog (printed, magnetic tape, due to be released summer/fall 1986)

NASA funds the Infrared Processing and Analysis Center (IPAC) to support the research of users of the IRAS data. This facility, located in Pasadena, California, may be used by General Investigators (GI's). If a proposer wishes to use this facility, the usage should be described in the proposal, but it is not necessary to include any costs for using IPAC. The computer facilities available at IPAC include an IBM 3032, a CDC Cyber model 180/840, and 3 interactive image processing workstations. For GI's that want to use the IPAC facilities, the usage will be scheduled after the proposal selection. Office space and limited secretarial assistance will be provided during the period of time spent at IPAC. The purpose of the time at IPAC is to gather the reduced data necessary for scientific investigation. If funds are not required, a user may request access to the IPAC facilities on a noninterference basis by writing to the IPAC Chief Scientist.

A 300 page guide to the capabilities available at IPAC, the IPAC Users' Guide, is available upon request. A complete set of the IRAS data products, as well as the raw data, are available at IPAC. The tools available at IPAC to utilize the IRAS data include:

Point source and Small Extended Source Selection - Analysis of subsets created from the IRAS catalogs using infrared color-color plots, variability tests, area plots, log N - log S plats, etc., are possible. Comparison of selected sources with those contained in 50 major astronomical catalogs are possible. Other catalogs can be installed upon request if the catalog is provided in a machine-readable format. Palomar and ESO/SRC sky survey prints are available, along with the capability for making transparency overlays of specified positions.

Coaddition of Survey Data - Enhanced sensitivity can be achieved over a small area of sky by a factor of 3 over that achieved in the IRAS survey. Available in 1 dimensional form for point sources and 2 dimensional form for larger sources.

Image Processing Workstations - All image format IRAS data can be analyzed using the normal image processing functions on the workstation-based image processing systems. The image format data include the all-sky images, Nonsurvey (Pointed) observations, and Images created using coadded IRAS survey data. In addition, any image data in FITS format can be used on these workstations for comparison with IRAS data.

The Solar System Exploration Division plans to announce a Small Bodies Data Analysis Program. Proposal for research on asteroids and comets using IRAS data would be appropriate under that program. Information concerning the Small Bodies Program may be obtained from Dr. William Quaide, of NASA Headquarters, who can be reached at (202) 453-1597.

THE IUE PUBLIC DOMAIN DATA ARCHIVES

The International Ultraviolet Explorer (IUE) satellite is a joint project of NASA, the European Space Agency, and the United Kingdom's Science and Engineering Research Council. Its mission is to obtain ultraviolet spectra of a variety of astronomical objects. The observations are performed by Guest Observers in real time from one of the two ground stations, the NASA Goddard Space Flight Center in Greenbelt, Maryland, or the Villafranca del Castillo near Madrid, Spain. The satellite was launched in January 1978 and continues to operate well.

1. The IUE Instrument

The IUE spacecraft is in geosynchronous orbit and is operated in real time. The scientific functions are carried out by staff members working with the Guest Observer, who directs the scientific observations.

The Scientific instrument consists of a 45-cm diameter f/15 Cassegrain telescope, offset star tracker, and two echelle spectrographs for ultraviolet spectroscopy in the spectral region between 1150 and 3300 A. The spectrographs may be operated in either of two modes, high resolution (0.1 - 0.3 A) or low resolution (6 - 7 A). The two spectrographs are used to cover the short wavelength range (1150 - 2000 A) and the long wavelength range (1850 - 3300 A). The detectors are SEC Vidicon Cameras with ultraviolet converters.

2. IUE Data Characteristics

The spectral image is built up on the camera target during an exposure. The target is then raster scanned by the read beam and telemetered to the ground. The result is an image of the target consisting of 768 by 768 pixels, each with a value of 0 to 255 Data Numbers. The data are linearized and corrected for flat field effects. The spectrum is then extracted and calibrated using standard calibrations maintained by the IUE staff.

The IUE low dispersion spectra are absolutely calibrated using ultraviolet spectral standard stars calibrated by other satellites. The IUE high dispersion spectra are obtained in echelle format, thus consisting of portions of fifty orders of the spectra which are corrected for blaze angle effects. The wavelength calibration is derived from platinum-lamp spectra obtained at regular intervals.

The IUE data are available in the raw form, at various intermediate processing steps, and in final extracted and calibrated form so that the user may apply special calibrations or extractions if desired. The data are available on magnetic tape in a standard IUE tape format.

The details of the data processing have changed with time. The changes have been well documented, but can affect data quality. Specific images may be reprocessed upon request using the up-to-date version of the software.

3. Description of the Archives

A list of IUE observations, with descriptive information, is maintained by the Observatory in the IUE Merged Log. The entries include target name, coordinates, target description, camera, exposure time, dispersion mode, aperture, processing date, and image quality code, for observations obtained at Goddard and Villafranca. The Merged Log is available on microfiche, sorted by right ascension, object type, and observing date. In addition, interactive computer searches on the log may be performed at the IUE Regional Data Analysis Facilities (RDAF's; see below).

The IUE archives, as of mid-1986, include about 50,000 images. Virtually every kind of astronomical object has been observed with IUE, including solar system objects, hot stars, cool stars, variable stars, nebulae and the interstellar medium, and extragalactic objects.

The primary data archive is maintained by the National Space Science Data Center at the NASA Goddard Space Flight Center. In addition, the extracted spectra are available for analysis at the IUE RDAF's (see below). The Goddard RDAF can fill requests by mail for tape copies of specific extracted spectra.

A quick-look evaluation of specific IUE images can easily be performed at Goddard. The original observing scripts, as filled out by the Guest Observers and Observatory staff, are available for inspection. A browse file of photowrites (photographic representations of the IUE images) is maintained for images obtained at Goddard to permit evaluation of data quality and identification of camera artifacts. The IUE Observatory staff are on hand to assist visitors in interpreting the details of the observations, processing, or calibration, or answer any questions the visitor might have.

4. The IUE Regional Data Analysis Facilities

The IUE RDAFs are available to all investigators wishing to analyze IUE data. One facility is located at the IUE Observatory at the NASA Goddard Space Flight Center. The other facility is located at the University of Colorado in Boulder.

The RDAF's provide comparable services using similar hardware and software. A minicomputer with peripherals is available for reading IUE data tapes, storing data on disk, generating quick-look plots and listings, and generating publication quality plots. On-line software helps the user identify and evaluate data of interest. The IUE Merged Log may be searched interactively. The Goddard UV Flux Catalog provides a condensed version of the low dispersion spectra, giving fluxes in specific standard wavelength bins. Data analysis assistants can retrieve the extracted data for requested images on a 1-day basis and load the spectra into the computer for the visitor's analysis. The IUE analysis software is easy to use, requiring only a short period of training. Documentation and on-line help

are available. Experienced staff members are on hand to provide training, to assist with the software and interpreting IUE data, and to produce specialized software if needed.

5. Further Information

Several documents are available which describe various aspects of IUE observations, processing, and data analysis. These include the IUE Observer's Guide, the IUE Data Analysis Guide, the IUE Image Processing Information Manual, and a series of NASA IUE Newsletters. For further information please contact Dr. Catherine L. Imhoff, Code 684.9, NASA Goddard Space Flight Center, Greenbelt, Maryland 20771 (telephone 301-286-6749).

I. HEAO-1 DATA ARCHIVE

The first High Energy Astronomy Observatory (HEAO-1) was launched on August 12, 1977, and successfully operated through January 9, 1979. It carried a complement of four investigations dedicated to observations of the x-ray sky over the energy band 0.1 keV to 10 MeV. The instrument complement consisted of the following investigations:

1. Large Area X-ray Survey Experiment (A-1)/Naval Research Laboratory;

2. Cosmic X-ray Background Experiment (A-2)/NASA Goddard Space Flight Center and Pennsylvania State University;

3. Scanning Modulation Collimator Experiment (A-3)/ Smithsonian Astrophysical Observatory and Massachusetts Institute of Technology; and

4. Hard X-ray and Low Energy Gamma Ray Experiment (A-4)/ University of California at San Diego and Massachusetts Institute of Technology.

The primary objective of the mission was to conduct an all-sky x-ray survey. This was accomplished by operating the observatory primarily in a survey mode with the experiments scanning great circles on the sky every 33 minutes in a narrow band orthogonal to the Earth-Sun line. The entire sky was scanned twice, and about half the sky was scanned a third time. Commencing in November 1977, pointed observations of selected targets lasting approximately 6 to 12 hours were interwoven with the scanning program, with the duration and frequency of such pointings gradually increasing throughout the remainder of the mission. In the following sections, the characteristics of the HEAO-1 experiments and the nature of the corresponding data bases are summarized.

I.1. LARGE AREA SKY SURVEY EXPERIMENT (HEAO-A-1)

The Large Area Sky Survey (LASS) Experiment onboard HEAO-1 was a modular assembly of seven thin window proportional counters sensitive from 0.25 to 25 keV. The detectors had varying fields of view and look directions. The HEAO A-1 group at the Naval Research Laboratory (NRL) has an ongoing program of processing A-1 data in such a way that subsequent analysis may be performed, either by the A-1 group or by guest investigators. The major features of this evolving data base are given below.

The A-1 instrument consisted of seven collimated proportional counters. Six of these were located on the -Y side of the HEAO-1 spacecraft; the seventh was on the +Y side and was coaligned with the other experiments on board HEAO-1. The detectors were sensitive from 0.25 to 25 keV. Module 7 (+Y side of spacecraft) had an open area of 1900 cm^2 and a $2^\circ \times 8^\circ$ (FWHM) field of view. Modules 1-4 (the scan modules) each had 1650 cm^2 areas and $1^\circ \times 4^\circ_2$ (FWHM) fields of view. Modules 5 and 6 had open areas of 1350 cm^2 each; they were offset in pointing direction from the scan modules by $\pm 0.33^\circ$ and had smaller fields of view ($1^\circ \times 0.5^\circ$ FWHM) to improve source positioning. The total collecting area available was reduced from the initial 11,200 cm^2 to 6,400 cm^2 by the end of the 17-month mission due to the failure of several modules during the flight.

The A-1 data base contains x-ray observations of more than 1000 of the brightest x-ray sources in the sky, as well as several x-ray transients and gamma-ray bursts which had outbursts during the HEAO-1 mission. It is the most sensitive survey to date in this energy band. The 1H catalog contains 842 of the approximately 1400 sources estimated to be in the data base. The A-1 data base is currently maintained in the following formats:

A. Sky Bins - counts (time) + aspect (time) for scanning data;

B. Point Maneuvers - counts (time) + aspect (time);

C. High Bit Rate - counts (time) + aspect (time);

D. Scans - counts (aspect) for various depths of summation, e.g., single scans, 12 hours, 1 day, 4 days; and

E. 1H Catalog - image of sky, accessible to sort routines.

It is convenient to think of the data base as having two aspects: a source detection and location aspect (survey aspect) and a source variability aspect. The survey aspect of the data base is typically used either to determine the position and flux of x-ray sources, or to search for an x-ray counterpart to a known astronomical object. The primary data consists of scans summed to various depths; sources are detected by fitting models of the background, plus the expected point source collimator response to

the data. The variability aspect of the data can be used to search for periodic, quasi-periodic, or aperiodic variability in x-ray sources on time scales from microseconds to months or years. Shorter period timescales are best searched by using pointed mode data. Longer time scales can be studied by constructing light curves from repeated detections of a source in the scanning data base. The time scales at which a given source may be studied depend on both the data acquisition mode of the A-1 experiment at the time the source was observed and on the source brightness.

Sources brighter than 2-3 uJy typically stand out well against the background in the A-1 data base, while detecting sources fainter than 2 uJy requires more sophisticated analysis techniques. Sources as faint as 0.2 uJy can be detected in 1-day summations of the scan data, although the nonnegligible possibility of spurious source detections at this flux makes large area surveys to this flux limit impossible. The flux limit for pointed data depends on the stability of the spacecraft aspect and on the ability to estimate the background. Sources brighter than 3 uJy dominate the background, while fainter sources are typically identified from unique variability patterns (e.g., pulsations).

The minimum flux at which variability can be studied on a given time scale is different for scanning and pointing data. For scanning data, daily and longer variability can be studied for sources brighter than 1 uJy, and hourly variability (scan-to-scan variability) for sources brighter than 10 uJy. For scanning data, the limits depend on data acquisition mode and stability of spacecraft aspect. However, microsecond variability can be studied in the brightest sources observed in the high bit-rate mode, and pulsations can be detected from sources with pulsed flux as faint as 0.05 uJy.

HEAO A-1 has supported a substantial number of guest investigators, with most investigators having carried out their research projects at NRL in collaboration with NRL scientists. Successful analysis of A-1 data requires the investigator to deal with the complexities of scanning data, as well as the variations in A-1 detector performance. The A-1 detectors were subject to variation from geomagnetic effects (South Atlantic Anomaly), orbital effects (occultation, Earth limb), detector failures, and other noise signatures. No automatic software data deglitcher is currently thought feasible, so analysis with an A-1 expert is highly recommended.

Two classes of software are needed for analyzing A-1 data. The first class is used for extracting the needed data from the data base. For scanning data, routines are available to fit models of the background plus sources folded through the instrument response in order to extract source fluxes and positions. For pointing data, software is available for obtaining counts as a function of time, corrected for spacecraft aspect when the source position is known. The second class of software can be applied to the data to

study the properties, typically temporal, of the x-ray source. Available software includes routines for period searching, Fast Fourier Transforms (FFT's), and constructing light curves. Support software is also available for conducting large scale surveys of the data base and plotting results.

The following are some recent references containing useful information on HEAO A-1 analysis techniques:

1H Catalog, general instrument description, survey: Wood et al. (1984), Ap.J. Suppl., 56, 507.

Variability from scanning data: Ambruster, Snyder, and Wood (1984), Ap.J., 284, 270; Cominsky and Wood (1984), Ap.J., 283, 765.

Variability from pointing data: Meekins et al. (1984), Ap.J., 278, 288; Norris and Wood (1987), Ap.J., 312, in press; Beall, Wood, and Yentis (1987), Ap.J., in press.

Survey Methods: Kowalski et al. (1984), Ap.J. Suppl., 56, 403; Hertz and Wood (1985), Ap.J., 290, 171; Shrader, Wood, and Matilsky (1986), Ap.J. Suppl., 61, 353.

To obtain further information concerning the A-1 data archive, potential investigators may contact any of the following individuals at the Naval Research Laboratory:

Dr. Kent Wood
Code 4121
Naval Research Laboratory
Washington, DC 20375
Telephone: (202) 767-2506

Dr. Paul Hertz
Code 4121
Naval Research Laboratory
Washington, DC 20375
Telephone: (202) 767-2438

Dr. Jay Norris
Code 4121
Naval Research Laboratory
Washington, DC 20375
Telephone: (202) 767-2781

I.2. COSMIC X-RAY BACKGROUND EXPERIMENT (HEAO-A-2)

The HEAO-1 A-2 experiment consisted of six mechanically collimated proportional counters sensitive to x-rays in the range 0.1-60 keV (see Rothschild, et al., Space Sci, Instr., 4, 269, 1979 for a complete experiment description). Two of the detectors were filled with propane and were sensitive to x-rays in the 0.1 to 3.0 keV band. The analysis of data from these Low Energy Detectors (LEDs) is described below. The remaining detectors (Medium Energy Detectors, "MED's", and High Energy Detectors, "HED's") were sensitive to higher energy x-rays, primarily from 1.5 to 60 keV. The principal objective of the experiment was to study the diffuse x-ray background, but the experiment also had good sensitivity to point sources.

A. MED and HED

The A-2 data base remains the best available source for the study of the diffuse x-ray background. It is also valuable for studying the spectra and variability of discrete sources whose flux is more than about 0.001 times that of the Crab (or about 2.0E-11 ergs/cm^2-sec in the 2 to 10 keV band). The following data products are available from the A-2 MED and HED detectors:

1. X-ray Source Catalogs: Computer readable copies of Table 1 from the complete high-latitude survey by Piccinotti, et al. (Ap.J., 253, 485 (1982)) and Table 2 of Marshall, et al. (Ap.J. Suppl., 40, 657 (1979)) are available from the NSSDC.

2. Condensed data tapes containing total count rates with 80 msec resolution, count rates with crude spectral information with 1.28 sec resolution, and Pulse-Height Analysis (PHA) data in 32 channels with 10.24 sec resolution.

The source catalogs are self-explanatory, but using the condensed data tapes requires the assistance of the science team. They can be used to provide spectral data, x-ray intensity maps, x-ray light curves, or source detections for any point on the sky. The analysis programs permit fitting of spectra from any location on the sky, determination of source locations and fluxes (or upper limits) for any direction, searching for pulsations, folding data using a known period, and maps of any region. Data from all the A-2 detectors can be combined to determine spectra over the entire 0.1 to 60 keV band.

B. LED

The HEAO-1 A-2 LED experiment consisted of two mechanically collimated proportional counters sensitive to x-rays in the range 0.1-3 keV (see Rothschild, et al., ibid. for a complete experiment description). The principal objective of the experiment was to study the diffuse soft x-ray background, but the experiment also had good sensitivity to soft x-ray point sources.

Because of the experiment's relatively long lifetime and nearly complete sky coverage, the LED data base remains the best available source for study of the diffuse background and x-ray point sources at energies below 1 keV.

The following data products are available from the HEAO-1 A-2 LED experiment:

1. LED Soft X-ray Source Catalog: EBCDIC card images on magnetic tape comprising Table 1 from Nugent et al. (Ap. J. Suppl., 51, 1, 1983), available from the NSSDC. This catalog contains information on 114 sources detected in two soft x-ray bands.

2. Condensed data tapes containing data from the broad-band "discovery scalers" with 1.28 sec resolution and PHA data in 32 channels with 10.24 sec resolution.

The Soft X-ray Source Catalog is self-explanatory and can be used without the assistance of the A-2 science team. The condensed data tapes require the assistance of the science team for use. The data came from two types of observations--scanning and pointed observations. They can be used to provide spectral data, x-ray intensity maps, or source detections for any point on the sky. Some of the data offers x-ray timing information with 80 msec resolution. Our analysis programs permit fitting of spectra from any location on the sky, determination of source locations and fluxes (or upper limits) for any direction, and maps of any region. We also have software that permits maximum entropy deconvolution of maps, calculation of x-ray light curves, and bin folding for timing analysis.

Some types of analysis (for example, source detections or limits, x-ray light curves, source spectra, or local intensity maps) can be performed by the A-2 science team for interested parties and supplied to them; more extended analyses or analyses of large numbers of objects may require a visit to Pennsylvania State University (LED data) or the NASA Goddard Space Flight Center (GSFC) (MED and/or HED data) for a period ranging from several days to several weeks.

Potential investigators interested in using the A-2 data archive may contact the Principal Investigators (see below) for advice concerning the feasibility of planned projects, the amount of time required, whether a visit to the data facility is required, and any other details.

LED:

Dr. Gordon Garmire
Astronomy Department
504 Davey Laboratory
Pennsylvania State University
University Park, PA 16802
Telephone: (814) 865-1117

MED & HED:

Dr. Elihu Boldt
Code 661
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt Road
Greenbelt, MD 2077
Telephone: (301) 286-5853

I.3. SCANNING MODULATION COLLIMATOR EXPERIMENT (HEAO A-3)

The Scanning Modulation Collimator experiment measured x-rays in the 1-15 keV region. The purpose was to produce precise locations (of order 1 arcminute) of x-ray sources on the celestial sphere so that they might be identified with optical or radio counterparts. These locations are diamond-shaped, about 1x4 arcminutes, and are degenerate, repeating on a grid roughly 15x11 arcminutes. The experiment had a $4^\circ \times 4^\circ$ overall field of view, and transmitted data in 3 energy channels with 40 and 160 msec time resolution. The two collimator banks had about 400 cm^2 and 300 cm^2 effective peak area, with background rates of about 12 counts/sec. The sensitivity was roughly to 10^{-11} ergs/cm^2-sec (2-6 keV flux), allowing us to detect most of the sources in the HEAO-A-1 catalog. At present, these include 420 unidentified sources and 150 "suggested" identifications which require confirmation. The data in the A-3 archive may be divided into two categories as follows:

A. Analyzed Data Records

For each detected source we can provide a map and a finding chart. The map is computer drawn and shows the multiple, diamond-shaped regions in celestial coordinates, along with error boxes of other x-ray experiments which reduce the multiple locations. The user is cautioned that the covert identification may fall well outside these other locations and may also fall slightly outside our own error regions! The finding chart is a blowup of a Palomar or ESO Schmidt sky survey photograph, with the A-3 diamonds superposed to about 5 arcseconds absolute accuracy.

These two products are especially easy to use. The sources are listed by an x-ray coordinate name (IAU convention), usually from the HEAO-A-1 catalog. These coordinates typically are 1° from the true source location and as much as 4° away. An astronomer who knows the coordinates of a putative counterpart can plot them on the map and see if the object falls within a region allowed for the x-ray source locations. An astronomer wishing to find an optical counterpart to an x-ray source can take the sky survey finding chart and examine objects in diamonds. In both cases, of course, the astronomer would need some familiarity with the published literature to assess the chance probability of an object of a given class falling in the location. Although these data are now freely available to the community, we do plan to publish their locations in the literature and hope they will be properly referenced, including as "in preparation."

B. Reduced Data Records

One file is generated for each of about 1500 trial binning positions at which a possible x-ray source was thought to exist. The files preserve data from each satellite revolution (a 20 seconds sample at 30 minute intervals) and each of the 2 or 3 celestial scans (about 4 to 8 days at 6 month intervals) through the region. Raw counts and exposure units are folded and coadded into 60 phase bins for each collimator (30 arcseconds and 2 arcminutes (FWHM), respectively), for each of three energy channels. The celestial aspect solution is merged. We also provide the catalog that lists the binning positions, and all the software we use to analyze this data further to produce the "analyzed data records."

Our computer configuration consists of Data General NOVA 4, S/200, and S/230 hardware, with a Mapped Realtime Disk Operating System (RDOS) operating system. The hardware is not compatible with Advanced Operating System (AOS). We have a modified Command Line Interpreter (CLI) system, FORTRAN source code for Marco Command (MC) specific functions, and the SAS-3 assembly language code for x-ray library functions.

There are several possible uses of the reduced data. An observer may be interested in a source which we "failed" to detect; however, the observer might select the data according to different criteria or accept a lower signal to noise ratio. The observer may be interested in crowded fields which we could not handle, perhaps armed with ROSAT or AXAF data. Finally, the 40 msec samples, which were the only data mode for the 30 arcsecond collimator, are the highest time resolution which was always available from HEAO-1 (i.e., the other experiments had faster modes, but also slower modes, and switched back and forth). All of this analysis would be done most productively, at present, at either the Massachusetts Institute of Technology (MIT) or the Smithsonian Astrophysical Observatory (SAO). In addition, we have the facility to rebin an arbitrary celestial location by reading in the raw x-ray data and our final aspect solution (which we save).

Potential investigators desiring additional information concerning the A-3 data archive should contact:

Dr. Daniel Schwartz
Smithsonian Astrophysical Observatory
60 Garden Street
Cambridge, MA 02138
Telephone (617) 495-7232
(FTS) 830-7232

I.4. HARD X-RAY AND LOW ENERGY GAMMA-RAY EXPERIMENT (HEAO-A-4)

The A-4 archival data base consists of raw data on celestial objects in the 10 keV to 10 MeV energy range. As with the other HEAO-1 experiments, the A-4 data consists of both scanning and pointing mode data. The pointing observations covered 30 percent of the sky with 65 percent coverage of the galactic plane. Some of the pointings, designated as "ping-pongs," allowed for A-4 background subtraction, while the remainder did not, but may be used for timing studies. The A-4 data format is event-by-event with pulse height and timing information constituting the bulk of the data base.

The A-4 instruments consisted of seven coaligned NaI/CsI phoswich scintillators:

A. Low Energy Detectors (LED): 2 each with approximately 100 cm^2 net area each, 10-200 keV energy range, $1\text{-}1/2^\circ$ x 20° (FWHM) slat collimation, and 23 percent energy resolution at 60 keV.

B. Medium Energy Detectors (MED): 4 each with approximately 40 cm^2 net area each, 30 keV-2 MeV energy range, 16° (FWHM) circular collimation, and 10 percent energy resolution at 660 keV.

C. High Energy Detector (HED): 1 with 120 cm^2 net area, 150 keV to 10 MeV energy range, 39° (FWHM) circular collimation, and 10 percent energy resolution at 660 keV.

The A-4 instruments were also coaligned with the GSFC/PSU A-2 detectors, so that contemporaneous 0.1 to 10 MeV coverage is available during some time intervals.

All of the A-4 data are on magnetic tapes at both the University of California, San Diego (UCSD) and MIT. The software to analyze A-4 data was written to run on Varian V70 (UCSD) or Data General (MIT) computers. No telecommunications exist on either computer.

A guest investigator can expect 2 sigma sensitivities greater than or equal to 10^{-5} photons/cm^2 s keV for a 40 keV wide band centered at 100 keV for summing all LED scanning data. This is equivalent to approximately a 3-5 UHURU Flux Unit (UFU) x-ray source with a 1.7 photon power law spectrum. This is also equivalent to about 1/200 of the Crab Nebula intensity. The MED sensitivity is about 10^{-5} photons/cm^2 s keV at 300 keV and HED sensitivity is about 10^{-6} photons/cm^2 s keV at 1 MeV.

We estimate that analysis of a given source would require approximately 1-week's time to spin tapes and acquire spectra or light curves. An additional week would go into spectral fitting, temporal analysis, and/or evaluation of results. Hence, an observer should plan about 2 weeks per source, or perhaps somewhat less for multiple sources. The analysis must be done at UCSD or MIT due to the nontransportability of the software and need for PI institution interaction in data evaluation.

Potential guest investigators may refer to the A-4 SKYMAP results (Ap.J. Supplements, 54, 591, 1984) for a catalog of LED intensities of known x-ray sources in the broad energy bins: 13-25 keV, 25-40 keV, 40-80 keV, and 80-180 keV. This catalog is complete down to about 12 UFU or 1/75 of the Crab Nebula flux. It also contains a detailed description of the LEDS.

Both UCSD and MIT have listings of the HEAO-1 pointings along with dates of scanning epochs for investigators interested in specific objects. For further information, prospective guest investigators should contact:

Dr. Richard Rothschild
C-011
Center for Astrophysics and Space Astronomy
University of California, San Diego
La Jolla, CA 92093
(619) 534-3462

or

Dr. Alan Levine
Room 37-601
Center for Space Research
Massachusetts Institute of Technology
Cambridge, MA 02139
(617) 253-7525

HEAO-2 DATA ARCHIVE

The Second High Energy Astronomy Observatory (HEAO-2 or Einstein Observatory) carried a large x-ray imaging telescope with an angular resolution of approximately 4 arcseconds covering the energy range 0.2 to 4 keV. The observatory was in operation from November 1978 to April 1981, during which time 5600 observations were performed using four different focal plane instruments. Any one of two position-sensitive detectors or of two spectrometers could be placed at the focal point of the telescope. In addition to these, an objective grating also could be independently inserted in the path of the x-rays after reflection from the mirror. A "standard" collimated proportional counter operating in the energy range 1.5 to 20 keV was used to monitor all targets viewed by the telescope.

The amount of good quality data that have not been thoroughly analyzed is large. More than 10,000 x-ray sources were detected and located, and one-half to two-thirds of these remain unidentified. There are over 400 images of extended objects (clusters of galaxies, galaxies, supernova remnants, O-associations, etc.) and only a few have been studied in detail. The participation of many scientists is needed to extract the information and discover the surprises in this data set.

The two imaging detectors were an imaging proportional counter, the IPC; and a set of microchannel plates, the high resolution imager or HRI. The IPC had a field of view of 1° and an angular resolution of 1 arcminute. The HRI had a field of view of 25 arcminutes, and an angular resolution limited only by the telescope, or about 4 arcseconds. Spectral information could be obtained from the IPC through pulse height analysis of the x-ray events. No spectral information was generated by the HRI other than the obvious necessity of having all photons within the band pass of the telescope. There were 4900 images obtained with the IPC and HRI.

There were 700 spectra obtained using the three spectrometers. The solid state spectrometer (SSS) was the most efficient and sorted all photons within its 6 arcminute field of view into a spectrum with energy resolution of ~150 eV. The objective grating spectrometer (OGS) and the focal plane crystal spectrometer (FPCS) were high resolution, low sensitivity devices. Although they were optimistically used on a variety of targets, useful data were obtained only for the brightest sources. The energy resolution ($E/\Delta E$) of the OGS ranged from 10 to 100 and that of the FPCS ranged from 30 to 1000.

The monitor proportional counter (MPC) had a field of view of 45 arcminutes (FWHM), was coaligned with the telescope, and was always operating. Its sensitivity is limited by the calculation of background. Since it was not an imaging detector, the background calculation was based on times when the detector was looking at empty fields. As background varied, both with the

position of the satellite and with time, the background calculation is not a precise process. The detector yielded both timing and spectral information for the brighter sources and limited information for sources with strengths down to about 0.3 UHURU Flux Units (UFU).

All information from these detectors has been processed and is available through the Einstein Data Bank. Most information is available at the Harvard-Smithsonian Center for Astrophysics (CfA), but limited data and analysis facilities also exist at the Columbia University, the NASA Goddard Space Flight Center, the Massachusetts Institute of Technology, and the NASA Marshall Space Flight Center.

All images are available for immediate inspection and have been analyzed for certain basic information. Most importantly, the images have been searched for the presence of x-ray sources. Sources so found are first located and then the strengths, and sometimes the spectra, are measured. These results are recorded on computer printout which also displays the image as contours of constant x-ray surface brightness and gives positions of cataloged objects within the field. It is easy to print extra copies of this analysis, and these can be readily supplied upon request.

Images can also be supplied on FITS tapes and can be inspected quickly on TV monitors at CfA. Time and space on the CfA computer are reserved for data bank users, and tested programs for image analysis are available. Images can be smoothed, instrument response deconvolved, point sources subtracted, and surface brightness plotted as a function of azimuth or radius. Source data can be extracted from the images and analyzed to yield the IPC spectra or counting rates versus time. Data can be searched for periodicities down to submillisecond periods. Timing and spectral analyses can also be performed on the MPC data.

Data presentation and analysis routines have been developed with guest investigators in mind. The formats and programs are user-friendly and readily available when needed. Many guest investigators visit CfA and use the computer and software there to do their analysis. This is recommended for any state-of-the-art analysis. There are instrumental problems which sometimes strongly influence the results. Examples of problematic analysis situations are: determination of the reality of sources at the threshold of detection, or of faint spatial extensions of strong unresolved sources; the accuracy with which model spectra can be fit to data; and, determination of faint diffuse emission spread over one or more instrument fields.

It is common practice to send hard copy printout or FITS tapes to data bank users and it is sometimes possible to run analysis programs for users who cannot visit. In this situation, however, care must be taken to ensure that the physics decisions are properly made before the analysis starts.

Spectrometer data, from the SSS, FPCS, and OGS, are also available. The analysis of these data, however, is more difficult. The instrumental calibrations are complicated, and use of the existing analysis programs requires a detailed understanding. Use of these data by guest investigators is certainly possible and encouraged. Guests, however, will usually need help from a staff member familiar with the eccentricities of the instruments. Usually a collaboration with one of the instrument scientists or a visit to the appropriate institution is required. This is also true for those wishing to extract fast timing information from the MPC.

Information about all these instruments and the corresponding data archives can be obtained by contacting the following individuals:

IPC and HRI:
Dr. Fred Seward
Smithsonian Astrophysical Observatory
60 Garden Street
Cambridge, MA 02138
Telephone: (617) 495-7282
(FTS) 830-7282

SSS:
Dr. Frank Marshall
Code 661
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt Road
Greenbelt, MD 20771
Telephone: (301) 286-5279
(FTS) 286-5279

FPCS:
Dr. Claude Canizares
Department of Physics
Massachusetts Institute of Technology
Room 37-501
Cambridge, MA 02139
Telephone: (617) 253-7500

MPC:
Dr. Martin Weisskopf
Code ES-62
Marshall Space Flight Center
National Aeronautics and Space Administration
Huntsville, AL 35812
Telephone: (205) 453-5133
(FTS) 824-5133

Literature has been written for guest observers and data bank users and is available upon request from Dr. Fred Seward at CfA. Useful items are:

1. A Catalog of Einstein Observatory Observations, (5600 pointings listed by right ascension and by type of target);

2. The Einstein Observatory Users Manual (A description of the standard-processing hardcopy output, and instructions for use of analysis programs available at CfA);

3. A list of data bank users or data bank requests for a particular observation; and

4. A catalog of published results from the Einstein Observatory (A bibliography sorted by year, author, and subject).

I. HEAO-3 DATA ARCHIVE

The third High Energy Astronomy Observatory (HEAO-3) was launched on September 20, 1979, and operated until May 30, 1981. It carried a complement of three investigations aimed at the study of cosmic gamma ray sources and of the cosmic rays. The instrument complement consisted of the following investigations:

(1) High Resolution Gamma Ray Spectrometer Experiment (C-1)/ Jet Propulsion Laboratory;

(2) Isotopic Composition of the Cosmic Rays Experiment (C-2)/ Centre D'Etudes Nucleaires de Saclay and Danish Space Research Institute; and

(3) Heavy Nuclei Experiment (C-3)/Washington University, California Institute of Technology, and University of Minnesota.

The primary objectives of the mission were to conduct an all-sky spectral survey of the gamma ray sky in the .06-10 MeV band and to perform detailed investigations of the isotopic composition and heavy nuclei component of the cosmic rays. This was accomplished by operating the observatory in a survey mode in which the experiments scanned great circles on the sky every 20 minutes in a narrow band which was normally orthogonal to the Earth-Sun line. In order to increase the exposure of the gamma ray spectrometer to the galactic plane, the spin axis of the spacecraft was oriented toward the galactic pole during two periods in September 1979 and March 1980. In the context of this program, only investigations utilizing data from the C-1 and C-3 archives will be considered. In the following sections, the characteristics of the C-1 and C-3 experiments and the nature of the corresponding data bases are summarized.

I.1. HIGH RESOLUTION GAMMA RAY SPECTROMETER EXPERIMENT (HEAO-C-1)

The primary objective of this experiment was to survey the sky in the low-energy gamma ray region (50 keV-10 MeV) for narrow-line sources of emission, such as nuclear gamma ray lines, 511 keV annihilation radiation, and cyclotron features. The instrument (see Figure 1 of Reference 1) consisted of a large, cryogenically cooled, high resolution germanium spectrometer, enclosed in a CsI anticoincidence sheild which collimated the field-of-view to 30° (FWHM).

The four independent high-purity p-type Ge detectors had a total volume of about 400 cm^3, and an initial resolution of approximately 3 keV at 1460 keV. The effective area ranged from about 75 cm^2 at 100 keV to 1 cm^2 at 10 MeV. Events not vetoed by the shield or the aperture charged particle detector were individually recorded at a maximum telemetry rate of 15 events per second per detector. Each event's time, accurate to about 100 usec, and 8192 channel Pulse Height Analysis (PHA) value were included, plus a 2-bit field indicating the number of detectors simultaneously triggered, and 2 bits indicating simultaneous events in the shield window, which was a pair of discriminators designed to detect shield energy losses near 511 keV. In addition, the total (unvetoed) count rates above the detector lower level discriminators (LLD, 45 keV) and upper level discriminators (ULD, about 10 MeV) were recorded for each detector every 10.24 sec. Due to radiation damage (Mahoney, Ling, and Jacobson 1981) to the germanium crystal structure caused by trapped radiation and cosmic rays, the detector resolution was degraded approximately linearly with exposure time and energy, such that the resolution at cryogen exhaustion was typically 20 keV at 1460 keV but nearly unchanged below 100 keV.

The CsI shield, of average thickness 6.6 cm, provided useful sensitivity to gamma ray bursts and solar flares. It had a total area of approximately 1000 cm^2 and was segmented into five independent sections, a thick collimator disk which contained the holes for the Ge field of view, and four identical sectors which comprised the rear section or well. For each of the five pieces an LLD (E > 100 keV, time resolution 1.28 sec) and ULD (3.8 MeV, 10.24 sec) rates were separately and continuously recorded, plus the shield window rate at 511 keV (10.24 sec). A 128-channel roving pulse height analyzer could be allowed to cycle from segment to segment, alternating 40.96 sec accumulation and readout periods, or could be commanded to dwell on any single segment. During much of the flight it was left on the collimator in order to obtain spectra of solar flares. In addition, the charged particle detector LLD (120 keV, 10.24 sec) and ULD (10.24 sec) rates were also monitored.

The germanium detectors operated from September 23, 1979, until cryogen exhaustion on June 1, 1980. Count rate date from the shields continued until the end of the HEAO-3 mission in June 1981. During two periods in the fall of 1979 and the spring of 1980, the spacecraft was operated so that its spin axis pointed towards the Galactic Pole, and the instrument scanned continuously in the Galactic Plane. The first of these periods extended from September 26, 1979, to October 10, 1979, while the second alternated between a galactic plane scan mode and the normal scan mode on a 7-day cycle extending from March 4, 1980, to April 4, 1980.

The raw instrument telemetry, plus orbit, aspect, and certain spacecraft housekeeping data, appear on the NASA production tapes which are presently in storage. The primary data base tapes consist of all the instrument, orbit, and aspect data plus some spacecraft housekeeping information on 2400 foot, 1600 bpi binary tapes intended to be read by FORTRAN programs running on the JPL Systems Engineering Laboratory (SEL) 32.55 computer. Each tape contains 1 day of data, with approximately 1 orbit per file.

From these tapes, a number of secondary data bases have been derived. The first of these consists of 3-day accumulations of sky-looking spectra in 2-dimensional arrays organized by energy (8192 PHA channels) and scan angle (60 bins, each 6°). Both the separate detectors and their sum are present, normalized to a standard PHA gain of 1.22 keV per channel. The data have been selected for transmission errors and on magnetic shell parameter L, zenith angle, time since last South Atlantic Anomaly passage, and charged particle detector rate. The 3-day superposition period corresponds to a HEAO spin axis motion of only 1/10 of the instrument FWHM field of view, so that the scan geometry is substantially fixed on such a short time scale. Again, the data are in the form of 1600 bpi binary tapes for the SEL 32/55. The same data are also available superposed on larger multiples of 3 days, as appropriate, for the study of the regions of the sky near the Ecliptic Poles, where the scan geometry is effectively fixed for longer periods.

A different data base, known as the scan tapes, also in the form of 1600 bpi binary tapes for the SEL 32/55, consists of the data from the 8 months of Ge detector operation, binned into time bins of approximately 20 sec duration. Except for the loss of detail entailed in the time binning and the omission of the simultaneous events, essentially all information is preserved. These tapes are organized 5 days per tape, and form the input to our scan-by-scan processing system.

A set of time-series plots of the primary 8-month period have been produced to a scale of about 24 inches per day. The data show key housekeeping, orbit and aspect information, and counts per 20.47 sec in each detector in each of four broad channels: 50-300 keV, 300-1000 keV, 1-4 MeV, and 4-10 MeV. The main purpose of this set of plots was to allow us to scan for periods of noise in the Ge detectors, which was primarily a problem in detector 2 during February and March 1980. Another series of tapes, used for searching for gamma ray bursts, contains mainly rate data from the shields.

Finally, a set of auxilliary data bases has been generated for use in the analysis. Noteable among these are the gain file, which contains periodic information about the gain of each detector; the aperture response file, which contains large tables giving the angular response of each of the four Ge detectors as a function of energy; small tables giving the detector effective areas as a function of energy and resolution as a function of energy and time; tables giving the approximate background for each detector as a function of energy; and a table giving miscellaneous information about nominal command settings, periods of bad aspect data, noise in detector 2, etc., for all the programs to draw upon. Each of these auxilliary data bases has its own set of programs and subroutines to maintain it and make the corresponding information available to the mainline analysis programs.

The main problems to be dealt with in the analysis of cosmic gamma ray line sources are the complicated and nonideal instrument transducer properties, necessitating large tables of instrument properties, the very low signal-to-background ratio (typically less than 10 percent), and the variability of the background, which is large and complex. Ordinarily, therefore, major guest investigations require that the investigators come to JPL, spend enough time in residence to master the experiment and the software, and interact closely with the JPL team in the interpretation of the results.

There are still many scientific opportunities in the data. Progress to date has been limited more by manpower constraints than data limitations, and we, therefore, expect that additional significant scientific returns can be realized if additional outside resources can be brought to bear. We are eager for others to participate and will do all we can to encourage their involvement and to facilitate their success.

Potential guest investigators wishing to discuss potential investigations using the HEAO-3 C-1 data archive should contact:

Dr. James C. Ling
Mail Stop 169-337
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California 91109
Telephone (818) 354-2819
(FTS 792-2819)

Additional details concerning the C-1 experiment can be found in the following references:

Mahoney, W. A., Ling, J. C., Jacobson, A. S., and Tapphorn, R. M., Nucl. Instr. and Meth., 178, 363 (1980).

Mahoney, W. A., Ling, J. C., and Jacobson, A. S., Nucl. Instr. and Meth., 185, 449 (1981).

I.2. HEAVY NUCLEI EXPERIMENT (HEAO-C-3)

Data from the Heavy Nuclei Experiment aboard the HEAO-3 spacecraft are available at the Space Radiation Laboratory of the California Institute of Technology (CIT). The experiment was designed to measure the elemental composition of cosmic rays for nuclei with atomic number greater than 18 with special emphasis on the trans-iron elements. The experiment collected data for 600 days, and the data set contains information on more than 20×10^6 iron nuclei with more than 10^4 nuclei of $Z>40$. The response of a Cherenkov detector and pulsed ion chambers are combined with trajectory information to yield an estimate of the atomic number, (Z_{est}), of each particle. A detailed description of the detector has been given in Nucl. Inst. and Meth., 185, 415, (1981).

Initial access to the data by a guest investigator would probably require residence at CIT for a period of approximately 3 months to get acquainted not only with the mode of access to the data but also with the pitfalls inherent in the analysis. Thereafter, the data can be accessed remotely or a selection can be transferred to the home institution of the investigator on tape.

The data are available in two forms: library and processed.

Library data consist of 600 tapes, one for each day in orbit and contain the bulk of the decoded data from the spacecraft. Cosmic ray events are sorted by preliminary analysis into those with $Z_{est} \leq 30$ and heavies.

Processed data consist of 22 tapes of refined data including:

Any event with $Z_{est} > 30.5$
One in 40 of all events
(selected at random).

For each event, the data include pulse heights and subsidiary information to allow selections and charge estimates to be made such as: trajectory, geomagnetic cutoff, data consistency, etc.

For more information contact:

Dr. Thomas L. Garrard
220-47 Downs Laboratory
California Institute of Technology
Pasadena, CA 91125
Telephone: (818) 356-6635

Additional information concerning the nature of the investigations possible using the C-3 data may be obtained from the following references:

Cosmic ray abundances of elements with atomic number $26 \leq Z \leq 40$ measured on HEAO-3. Ap.J., 247, L115, (1981).

The abundance of the actinides in the cosmic radiation as measured on HEAO-3. Ap.J., 261, L117, (1982).

Cosmic ray abundances of Sn, Te, Xe, and Ba nuclei measured on HEAO-3. Ap.J., 267, L93, (1982).

Elemental abundances of ultraheavy cosmic rays. Advances in Space Research 4, No. 2-3, 25, (1984).

Lead, platinum, and other heavy elements in the primary cosmic radiation - HEAO-3 results. Ap.J., 297, 111-118, (1985).

THE EXOSAT DATA ARCHIVE

During the operational phase of the European Space Agency's X-ray Observatory (EXOSAT), May 1983-May 1986, a total of 1996 pointed observations were made of a wide variety of astrophysical objects, including stellar coronae, x-ray binaries, active galactic nuclei, clusters of galaxies, and supernova remnants. The original observer maintains proprietary rights over the data for 1 year after receipt of the data (assumed to occur, at most, 1 month after the observation date). After this, the data becomes part of the EXOSAT archive and is available to the community at large. The only data that is withheld from the archive will be those for which there exists an outstanding calibration problem. Since there are very few such problems, this restriction will have little impact on requests. A complete description of the instrumentation that was available is given in any issue of the EXOSAT Express and references therein, or in Space Science Reviews-Vols. 30 and 40. A complete list of observations has been widely distributed (October 1986) and can also be obtained on request from the EXOSAT Observatory.

Proposals requesting EXOSAT archival data under the Space Astrophysics Data Analysis Program (SADAP) must include a completed EXOSAT Archive Request form (enclosed) which will be forwarded to the European Space Agency (ESA) for review. Investigators who do not require NASA funding of their proposed project should forward the completed form directly to Dr. Nicholas White, EXOSAT Project Scientist, at the address given below. The enclosed form includes space for a 100-200 word description of the purpose for which the data is to be used and how the proposed research will differ from earlier published work on the same data. Discussion between the original Principal Investigator (P.I.) and requestors is encouraged so as to avoid duplication of effort (and publications). Proposals that request NASA funding will also be judged on whether the proposed program is in conflict with any studies already underway. All archive requests will be approved by ESA, provided a convincing case is made that the data will be analyzed in a competent manner and that a new approach is justified.

The requestor should also state where the data is to be analyzed. The development of software to reduce EXOSAT data requires many man-years of effort, and is not recommended for the analysis of only a few observations. Data tapes will only be dispatched to those requestors who have access to an EXOSAT analysis system. An EXOSAT interactive analysis (IA) facility is available for this purpose currently at the European Space Operations Center (ESOC), but to be moved to the European Space Research and Technology Center (ESTEC) from January 1, 1987, onwards. This facility provides a comprehensive suite of software for analyzing most of the EXOSAT observing modes. Please state on the request form where the data is to be analyzed.

Those requestors requiring the IA facility should book the system separately after the request is approved. The data tapes will be ready for analysis on arrival. It is not possible to release IA software to the community.

The time taken for analyzing a particular set of data is dependent on the complexity of tasks. Simple extraction of spectra or images should take no more than a few hours. More detailed spectral or temporal analyses can be quite time-consuming. It is advisable to discuss the proposed tasks with the observatory staff when booking the IA system. New users of the IA system should, in any case, allow 2 days for familiarization with the system.

Individuals desiring additional information concerning the EXOSAT mission or data archive should contact Dr. Nicholas White at the following address:

Dr. Nicholas E. White
Division SB, ESTEC
European Space Research and Technology Center
2200 AG Noordwijk
THE NETHERLANDS

EXOSAT ARCHIVE REQUEST

I. NAME: _____

II. ADDRESS: _____

_____

_____

TELEX NO: _____ FAX NO:

TELEPHONE NO: _____

III. OBSERVATIONS (As listed in the Express or the Observatory Log).

	Date	Name	Original PI	Instruments
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Enclosure

IV. WHERE WILL THE ANALYSIS BE PERFORMED: _____

_____

_____

V. JUSTIFICATION (100-200 words).

Return to: Nicholas E. White
EXOSAT Observatory
European Space Agency Operations Center
Robert Bosch Str. 5
61 Darmstadt
FEDERAL REPUBLIC OF GERMANY (BEFORE November 1)

Nicholas E. White
Division SB
European Space Research and Technology Center
2200 AG Noordwijk
THE NETHERLANDS (AFTER November 1)

SMM DATA ARCHIVES

The Solar Maximum Mission (SMM) data set is divided into three epochs: (i) the first 8 and 1/2 months of pointed operation, from launch (February 14, 1980) to the failure of the spacecraft primary attitude control system (ACS) in November 1980; (ii) some 2 and 1/2 years of unpointed operation (November 1980 to April 1984); and (iii) the period of pointed operations since the SMM repair mission in April 1984. During the first period, all SMM science instruments obtained useful data; during the second, only the unpointed instruments (ACRIM, GRS, and HXRBS) were able to make meaningful observations; and in the third, all instruments except HXIS, which failed in November 1980, have returned scientifically meaningful data.

Most of the SMM data archives reside at the SMM Data Analysis Center (DAC), a facility of the SMM Experimenters Operations Facility (EOF) (Code 602.6, NASA Goddard Space Flight Center, Greenbelt, Maryland 20771), but several significant data sets exist only at the Principal Investigator's (P.I.) home institution. The DAC hardware includes a VAX 11/750 minicomputer (scheduled to be linked to the SPAN network this fall) and a variety of peripherals, such as color image display devices, color hardcopy units, and an optical disk system for retrieval of archival data.

In addition to the specific instrument data sets described below, there are several event (flare) lists available for use both on-line on DAC computers and in printed form. Investigators who would like to examine the event listings should contact the SMM Chief Observer, Ms. Judith Nelson, at the SMM EOF. The data set is broken down by instrument in what follows.

Active Cavity Radiometer Irradiance Monitor (ACRIM)

All ACRIM data, which are in the form of a total irradiance measurement obtained every 131.072 s, are currently available only from the Principal Investigator, Dr. Richard C. Willson, of the Jet Propulsion Laboratory in Pasadena, California.

Coronagraph/Polarimeter (C/P)

With the exception of a very small subset, the C/P data set, consisting primarily of 480 x 480 pixel images of quadrants of the solar corona, resides only at the High Altitude Observatory, P. O. Box 3000, Boulder, Colorado 80307. Inquiries should be directed to the Principal Investigator, Dr. Arthur Hundhausen. It is hoped to have a computer-controlled and computer-accessible video-disk subsystem in place at the SMM DAC in the next year, and C/P images will be an important pilot study of the data browse capability inherent in such a system.

Gamma-Ray Spectrometer (GRS)

GRS data consist of both hard x-ray (10 - 140 keV) and gamma-ray data obtained every 64 ms to 2 s. The gamma-ray data include both nuclear line data between 0.3 and 0.9 MeV obtained with an energy resolution of ~ 7%, as well as a measurements made with a broader band detector at energies of 10 - 100 MeV. The broad-band detector is also able to detect the signature of neutrons with energies about 20 MeV. GRS flare light curves are available on microfilm at the DAC. Actual spectra and light curves of solar flares, as well as data tapes containing the data base for searches for cosmic gamma-ray sources, are available at the University of New Hampshire (Durham, New Hampshire; Dr. E. L. Chupp, P.I.) and the Naval Research Laboratory in Washington, D.C. (Dr. G. Share, Co-I).

Hard X-ray Burst Spectometer (HXRBS)

HXRBS data consist of hard x-ray observations obtained every 128 ms in fifteen energy channels ranging from 25 to 400 keV; in certain events, memory data are available with as fine as 5 ms temporal resolution, but with no spectral information. The entire HXRBS data set is available at the DAC; the HXRBS group maintains its analysis software on both Sperry Varians and a VAX 11/750, the latter linked to the DAC VAX via a local area Ethernet network. The analysis software requires, at most, a few days of familiarity, and support in learning how to use the software is available from the HXRBS operations team. Investigators intending to analyze HXRBS data should contact Dr. Brian Dennis at the SMM EOF.

Hard X-ray Imaging Spectrometer (HXIS)

The HXIS data set consists of images from 2 fields-of-view in 6 energy bands from 3.5 to 30 keV. All significant solar flare data from HXIS are available at the DAC in a set of so-called HIMSEL tapes that include images (obtained as frequently as every 2.5 s during intense flares) from both the fine (8" pixels, 2'40" across) and coarse (32" pixels, 6'24" across) HXIS fields-of-view. Other data, such as quiescent active-region x-ray fluences, may be obtained from the original experimenter data tapes, which are kept in short-term storage offbase and can be retrieved in 2-3 days. There is currently no HXIS representation at the DAC, but scientific collabortions can be arranged with either Professor C. de Jager, Astronomical Institute at Utrecht, The Netherlands, or Dr. George Simnett, Department of Space Research, University of Birmingham (U.K.). Software for accumulating HXIS images, transferring them to disk for image analysis, and similar procedures is in place at the DAC, and Investigators wishing to use the DAC for analyzing HXIS data should contact the DAC Facility Scientist, Dr. Joseph B. Gurman, at the SMM DAC.

Ultraviolet Spectrometer and Polarimeter (UVSP)

The UVSP data set consists of spectra, spectroheliograms, Dopplergrams, magnetograms, and various other experiment modes at wavelengths of 1170 - 3600 A, obtained with apertures ranging in size from 1" x 1" to 15" x 268" and spectrograph exit slits between 10 mA and 2.3 A in width. The entire UVSP data set is available at the DAC. By the end of 1986, the UVSP data should be available on 2 optical disks to provide faster access to the entire reformatted data archive. Photometric calibrations for most common slit-detector combinations are available. Most UVSP data access and reduction software is based on the popular, interactive data language IDL, which is available for use on all DEC machines at the SMM DAC and EOF. This software is extremely easy to learn to use, and a new user can be accessing UVSP data in a matter of minutes without further assistance. Interacted Investigators should contact the Principal Investigator, Dr. Einar Tandberg-Hanssen, at Code ES01, NASA Marshall Space Flight Center, Huntsville, Alabama 35812, or Dr. Joseph B. Gurman at the SMM EOF.

X-Ray Polychromator (XRP)

The XRP is made up of 2 soft x-ray instruments, a Flat Crystal Spectrometer (FCS) and a Bent Crystal Spectrometer (BCS). The FCS data base includes polychromatic raster images (spatial resolution "14") and high-resolution spectra in the range 1.5-23 A, while the BCS data consist of multi-channel, high-resolution (/ " 10^4) spectra at wavelengths of 1.5-3.5 A. The XRP team has prepared a step-by-step software guide for all existing data analysis programs. The software allows users to reformat data from raw data tapes, subtract orbital background, and display FCS images, spectra from both instruments, and light curves from either instrument in selected channels. Data can also be saved for manipulation in IDL for user-specific analysis. If visits to the DAC are scheduled sufficiently in advance, XRP staff will be available to assist users in becoming proficient at the use of the XRP software in 1 or 2 days. Investigators interested in using XRP data at the DAC should contact Dr. Keith Strong of the Lockheed Palo Alto Research Laboratory at the SMM EOF.

NATIONAL SPACE SCIENCE DATA CENTER

For 20 years, the National Space Science Data Center (NSSDC) at the NASA Goddard Space Flight Center has provided data archiving and dissemination services for data obtained from NASA scientific missions across the range of disciplines covered by the NASA Office of Space Science and Applications (OSSA). The 1984 reorganization of NSSDC, and the 1985 appointment of a new Director, have resulted in numerous new thrusts at NSSDC, as discussed in the NSSDC Newsletters available at 301-286-6695.

Almost all of NSSDC's data holdings are on digital magnetic tapes or on such analog media as microfilm and microfiche. (NSSDC is actively moving into digital optical disk technology.) In responding to data requests from NASA-supported scientists, other U.S. scientists, and the international scientific community, NSSDC typically reproduces and mails small data volumes free to the requester and charges to cover expenses for larger data volumes. Occasionally reformatting is performed by NSSDC. Increasingly, subsetting will be possible. Electronic data dissemination via networks is starting to be used. Rates for magnetic tape data sets involving straight duplication are $25/tape or $45/tape, according to whether or not tapes are provided by the requester to NSSDC.

The data sets NSSDC holds are typically stand-alone data sets, in the sense that, with the data and documentation provided (instrument and data set descriptions, formats, etc.), a data recipient should be able to use the data. In a number of cases, the data recipient may want to interact with the data originator in the use/interpretation of the data. Most data sets are presently archived with no read or analysis software. Increased data set-specific software archiving, and the use of standard formats and generic data set independent software (graphics, etc.), are in NSSDC plans.

NSSDC maintains a major information base, primarily concerning data held at NSSDC. NSSDC is presently developing a high level on-line directory of information about important data sets held throughout the OSSA-related scientific community. This directory will characterize, point to, and increasingly link to distributed data sets and their associated detailed catalogs.

NSSDC, through its collocated Astronomical Data Center, provides machine-sensible catalogs of astronomical sources determined from both ground telescopes and various space missions.

The data sets held at NSSDC for the HEAO-1, IUE, IRAS, and SMM missions are briefly described in the following. Note that most of these data sets, and their parent instruments, are described in more detail in the writeups provided for this Dear Colleague Letter by these Projects. NSSDC has no data from EXOSAT, HEAO-2, or HEAO-3.

HEAO-1

Friedman - Large Area Cosmic X-Ray Survey

NSSDC holds an x-ray source catalog on microfiche. The catalog contains locations, apparent intensities, and cross-identification for 700 x-ray sources. NSSDC also holds a single tape containing 1-day scan summation data.

Boldt - Cosmic X-Ray Experiment

NSSDC holds pulse height analysis data and coincidence mode count rate data on 2 sets of 26 magnetic tapes each. The data, covering August 1977 to January 1979, were provided in 1985 and replaced a much earlier data set. Published hard and soft x-ray source catalogs are also held on magnetic tape.

Peterson - Low Energy Gamma-Ray and Hard X-Ray Sky Survey

NSSDC holds plots and source listings on microfiche. The plots are 10-day-summed count rate in 1-deg azimuth bins. Also held are skymap display files, and a hard x-ray source catalog, on magnetic tape.

Schwartz - X-Ray Scanning Modulation Collimator

NSSDC holds scanning count rate data in 3 energy channels on 100 magnetic tapes.

International Ultraviolet Explorer (IUE)

NSSDC holds, on 756 6250-bpi magnetic tapes, the "spectral images" and extracted spectra provided by the project (NASA and Vilspa) on less dense, less highly blocked tapes. The extracted spectra are also held on the IBM/3081 mass store for electronic accessibility. Images and/or extracted spectra can be sent out on request on tape. In addition, NSSDC holds the photowrites on 8x10 film sheets for the NASA-acquired images, and holds on microfiche the Merged Observatory Log which identifies all past observations.

Infrared Astronomical Satellite (IRAS)

NSSDC has extensive holdings of IRAS data available for dissemination. The data products include:

Point source catalog on mag tapes (2) and microfiche;
Skyplate survey images on mag tapes (74) (HCON 1, 2, 3);
Skyplate survey images on film;
Working survey database on tape (1);

Tape catalog of high source density bins;
Catalog of small scale structure on tape (2), microfiche;
Zodiacal history file on tapes (3);
All-sky data on tape (1) and film;
Galactic plane data on tape (2) and film;
Pointed observations on tapes (66);
Tape catalog of low resolution spectra.

These products are further discussed in the IRAS-provided material also appended to this Dear Colleague Letter. They, and IRAS processing generally, are discussed in great detail in the book "IRAS Explanatory Supplement" which was produced by the Project and is available from NSSDC.

Solar Maximum Mission (SMM)

Except for an observing catalog and a limited amount of proprietary data, NSSDC has no data from SMM.

For requesting data from NSSDC, or for inquires about NSSDC data holdings and services, contact:

Request Coordinator
Code 633.4
Goddard Space Science Data Center
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, MD 20771
Telephone: 301-286-6695
SPAN: NSSDC: :REQUEST

NSSDC is archiving the following OAO 2 and OAO 3 data sets.

OAO 2 - Celescope

The major NSSDC archive for the OAO 2 Celescope Experiment comprises a Celescope Catalog available on a magnetic tape, a reel of microfilm, and a hard copy. Other supplemental data sets include a bibliography on tapes for the Celescope Catalog, and a computer program package on a tape needed to process the magnetic version of the Celescope Catalog.

This catalog is the first ultraviolet (UV) catalog of celestial objects, and it is based on more than 8000 ultraviolet television pictures taken by the Uvicon cameras of Celescope. During 16 months of operation (December 1968 - April 1970), Celescope observed approximately 10 percent of the entire sky, including 20 percent of the region near the Milky Way.

For each observed object, the tabular listing includes: 1) the Henry Draper (HD) number; 2) the right ascension and declination (epoch 1950); 3) the visual magnitude; 4) the photoelectric colors B-V and U-B,

5) spectral type and luminosity class; 6) the observed ultraviolet magnitudes (for the 4 passbands) and standard deviations; 7) the right ascension and declination (epoch 2000); 8) the weighting values used to obtain the average ultraviolet magnitudes reported; 9) a code referring to the general type of object observed; 10) codes indicating photometric properties of the object; 11) codes indicating spectral characteristics of the star; 12) a remarks column, and 13) a listing of bibliographic references.

OAO 2 - Wisconsin UV Photometer

The Wisconsin equipment package consisted of 7 telescopes (a set of 4 stellar photometers, a nebular photometer, and a set of 2 grating spectrometers) designed to make spectrophotometric measurements of selected celestial objects in the 1050-3000 A range.

NSSDC is archiving raw data from all of the instruments, as well as reduced data from the stellar photometers. These data, available on 414 magnetic tapes and 99 reels of microfilm, were ordered by the date and time of observation. To find observations of a particular object or location, the user should first refer to the catalogs available at NSSDC on microfilm or on magnetic tape, find the orbits containing the data desired, and then request those tapes containing the desired orbits.

Other supplemental data sets include archive maps on microfilms describing an orbit-by-orbit history of the OAO 2 spacecraft, a data subset of ultraviolet stellar spectra for 330 selected stars on a tape, and the ultraviolet photometry data of 531 selected stars on a tape.

OAO 3 - Princeton UV Telescope Spectrometer

The primary objective of this instrument was to make quantitative observations of interstellar absorption lines with a resolution of about 0.05 A between 950 and 1450 A, and 0.025 A between 1650 and 3000 A. The secondary objective was to observe UV spectra of selected bright stars.

NSSDC is archiving UV reduced data on 10 magnetic tapes and 164 reels of microfilm. The header information on the tapes consists of star observation number, spacecraft equivalent time clock reading, number of points in data scan, photomultiplier tube number, longitude of ascending node and orbit, GMT of observation, first and last times and wavelengths of scan, satellite and Earth orbital parameter, total observed counts, sigma and average counts, and reduction year, day, and fraction of day.

A catalog for the reduced data is available on 4 microfiche cards. There are 2 separate listings of information - one ordered by HD number and the other ordered by star/object name. The observations can be identified on tape by the orbit numbers in this catalog.

Other supplemental data sets include the Tau Scorpii UV spectral atlas on a tape, the Iota Herculis UV spectral atlas on a tape, the Princeton UV experiment observing history on a tape, star data sorted by target star on 5 tapes, far-UV spectral data for 60 O- and B-type stars on a tape, and the Beta Orionis UV spectral atlas on a tape.

OAO 3 - UCL/Mullard Experiment

This instrument was designed to observe celestial x-ray sources between 1 and 3 A, 3 and 9 A, 6 and 18 A, and 20 and 70 A. The 3 to 9 A and 6 to 18 A systems became inoperable in June 1973 when a background shutter stuck in the closed position. Most of the observations after this were made with the 1 to 3 A system.

NSSDC is archiving 28 magnetic tapes of reduced data, quick-look plots of the reduced data on 2 reels of microfilm, and an observing catalog.

The reduced data are all in a continuous time sequence covering the interval from August 1972 to December 1980. The data record contains Universal Time of start of data frame, observation constraint symbols providing pointing of the instrument, x-ray count acceptance period, detector counts in 1-3 A, 3-9 A, and 6-18 A spectral channels, background shutter position, Pulse Height Analyser (PHA) fed from 1-3 A, 3-9 A, and 6-18 A channels, PHA channel counts, guard counts, high or low sensitivity, pulse shape discriminator speed and mode, detector high tension, experiment heater condition, background alternate mode, low voltage power supply condition, iris selected, filter selected, analog telemetry group, operating mode, star tracker axis count, analog telemetry word, day of year, and year.

The observing catalog contains 2 separate listings, the first in chronological order and the second in ascending order of the right ascension of the source. The catalog covers the timeframe August 1972 through February 1981.

RELEVANT RESEARCH AREAS

The research area(s) designated on your title page will be used to determine which panel(s) reviews your proposal. If you are using multiple data sets, indicate on your title page all relevant data sets and research areas. Below is a list of recommended research area key words:

IRAS Research Areas
- Extragalactic
- Molecular Clouds/Star Formation
- Stellar Systems, Galactic Objects
- Diffuse Emission and Galactic Structure
- Other

IUE Research Areas

- Hot Stars
- Cool Stars
- Variable Stars
- Interstellar Material
- Nebulae
- Extragalactic Sources
- Solar System Objects
- Binary Stars
- Active Binary Stars

HEAO/EXOSAT Research Areas

- Stellar Systems
- Compact H-Ray Binaries
- SNR's/ISM
- Clusters of Galaxies
- AGN
- Normal Galaxies
- Cosmic Rays
- Miscellaneous

SMM Research Areas

- Solar Interior
- Solar Chromosphere
- Corona
- Flares
- Solar Winds
- Helioseismology
- Solar Activity Cycle
- Solar Active Regions
- Prominences

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